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Alphabetical Index to Advertisers, Page 8. Where to Buy It in the West, Pages 9, 10, 11.

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VOLUME XXVII SAN FRANCISCO, AUGUST 19, 1911 NUMBER 8

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HUNTING RESERVOIR SITES IN THE HIGH ROCKIES

BY ROBERT SIBLEY.

During the past several years the progress of the great Northwest in matters of development has been next to miraculous. The conversion of barren lands into rich fruit bearing regions has taken place on all sides. Especially is this true of that portion of the Northwest situated in Western Montana. A few years ago this great commonwealth was known as the Treasure State, symbolic of its great wealth in mineral resources. Its millions of acres of arid lands in the eastern portion of the State were thought to be hardly fit for sheep herding, while the timbered lands on the Pacific Slope were thought to involve too heavy an expense in clearing to ever be of profitable value.

Today the change is marvelous. Mineral production in the State is already exceeded by agricultural returns. In Eastern Montana gigantic reclamation projects are being undertaken both by the government and private enterprise under the Carey land act. These transitions are second place, however, to the beautiful and scientific development taking place in the protected valleys in the western portion of the State. Here, lands that were stripped of every available stick of timber and left to bleach their once sheltered soils in the noonday sun are beginning to reappear as modern productive orchards, fruitful and profitable.

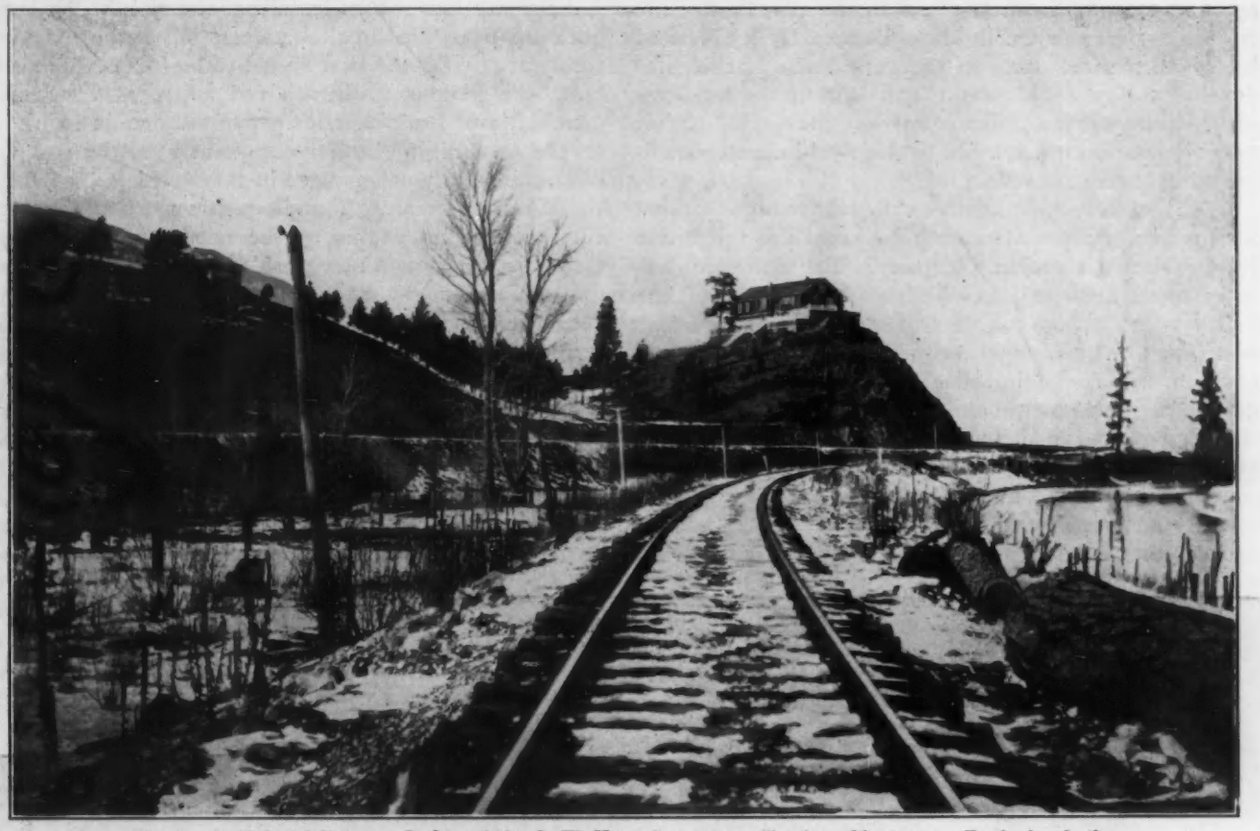

Fig. 1. Delightful Summer Lodge of the O. W. Kerr Company, Charlos, Montana. Typical of the many artistic retreats being constructed in the Bitter Root Valley. Large canal shown below club house.

Typical among these valleys is the fertile Bitter

Root which extends north and south about sixty miles in length and varies in width from four to twelve miles. At the head of this valley where the beautiful Bitter Root river joins the murky Missoula is located the thriving Western Montana metropolis, the city of Missoula. According to the last official census returns Missoula ranks third in cities of the State with a tributary population of about fifteen thousand people. The Bitter Root valley is of historic interest, as it was traversed from end to end by Lewis and Clark over a century ago. It was first called to the attention of the world, however, when the late Marcus Dailey located his gigantic stock farm in the very heart of this productive valley. This farm had within its holdings some twenty-seven thousand acres and after a few years' operation it produced to the world many record-breaking thoroughbreds.

Fig. 2. A Few of the Native Aborigines Encountered in Hunting Reservoir Sites.

The eastern side of the valley is being supplied with water by a private enterprise known as the Bitter Root Valley Irrigation Company. The company has reservoired a large lake in the western side of the valley with cubical contents of some 25,000 acre feet of storage, which, together with the natural flow of streams crossed on line during early months of irrigation, it proposes to irrigate about 40,000 acres of rich fruit lands. The water is syphoned across the valley by a steel pipe six feet in diameter and thence conveyed by ditch some seventy miles, feeding numerous laterals en route.

Another enterprising company materially assisting in the development of the Bitter Root Valley is the O. W. Kerr Company of Minneapolis, Minn., whose delightful summer lodge is shown in Fig. 1. This company's holdings are situated at the upper end of the valley on the west side of the Bitter Root river.

The west side of the valley has an unusual natural supply of water. The mountains on the west side are steep and precipitous and contain numerous small lakes hidden under the brow of banks of perpetual snows. From end to end the west side is traversed about every five miles by cool, swiftly running mountain streams. These streams are not only cool and refreshing to drink, but, being loaded with trout, furnish abundant sport for those inclined toward this branch of recreation. As most of these swiftly running streams are easily diverted upon the neighboring lands, the early settlers appropriated the natural rights many times over. In the early days the lower lands of the valley were thought to be more fertile, especially for grain and hay, and as it was an easier task to construct ditches upon these lands than those higher up on the benches, nearly all the older rights in the streams belong to the lower lands.

Science has shown later that the rich bench lands back up near the break between the mountains and valley are by far the best suited to high class orchards. Here the famous McIntosh red apple is king, and Lambert and Bing cherries prove tougher in skin, due to the cool nights, and consequently better shippers than known any other place in the world.

As the streams bounding down from the high Bitter Root mountains to the west emerge through steep box canyons a new problem presents itself when the rancher endeavors to put a gravity system of irrigation upon his orchard tract. First as his land is just being reclaimed the natural flow of the stream is probably already appropriated many times over, and second, the rocky approaches from stream to land make it costly to bring water upon his land as the acreage fed by each stream is small. Hence it is first necessary for him to store flood waters to acquire necessary water rights, and second his little distributing system must be most carefully and scientifically planned.

It was the solution of this problem over and over again that caused the writer of this article to go into the high recesses of the Bitter Root mountains, get reservoir data, build dams and headgates, and finally

Fig. 3. A Typical Storm Gate Construction, Bitter Root Valley.

In the Heart of the Rockies.

Fig. 4. A Delightful Trout Pool, a Camp in the Heart of the Bitter Root Mountains, a Construction Pack Train and Hotel de Bum, Miles From Civilization.

Fig. 5. A Twenty-Foot Rock Crib Dam in Construction at Upper Twin Lake and a Mammoth Snowslide Effect Encountered on Line.

bring the water upon the land. Many interesting little problems had to be solved, and I shall endeavor to touch briefly upon a few of these.

The best authorities consider that 24 in. of rainfall is ample in Western Montana, if carefully distributed, to properly irrigate and mature all kinds of crops. The rainy season takes place as a rule during the month of June, consequently it is considered that 18 in. of water actually delivered upon the land is ample for irrigation of all sorts. In extensive irrigation systems 12 in. is allowed for loss by seepage and evaporation, as conduits are all dirt ditches whenever possible. Hence, in laying out a typical irrigation system in Western Montana from 24 to 30 in. of water are allowed, or in other words from 2 to 2½ acre ft. per acre to be irrigated.

Due to the heavy snows in the high mountains to the west it is found that water in sufficient quantities many times over can be supplied from neighboring streams to irrigate all available lands up to July 1st, or in good years until July 15th. For orcharding it is necessary to irrigate to September 1st, or in other words, six weeks' storage must be supplied in the mountains to tide over flood-water rights in the natural stream.

By the statutes of Montana a miner's inch of water is thus defined: One cubic foot per second shall be equivalent to forty miner's inches. Let us suppose for a moment that we are looking at a stream of water. That in this stream blocks of ice measuring exactly 1 ft. by 1 ft. by 1 ft., or in a word, 1 cu. ft. in contents are floating down past our field of vision. We have a stop watch in our hands and count the number of blocks of ice that flow past us every second. Now, then, if five flow past per second the ice when melted would represent 5 second feet of water, or 200 miner's inches of water, Montana statutes.

The first settlers of the State early acquired the

Fig. 6. Some Severe Cliff Work Along Line, an Engineer's Pack Train, the Perpetual Snows of the Bitter Roots, and a Typical Deliciously Cool Waterfall.

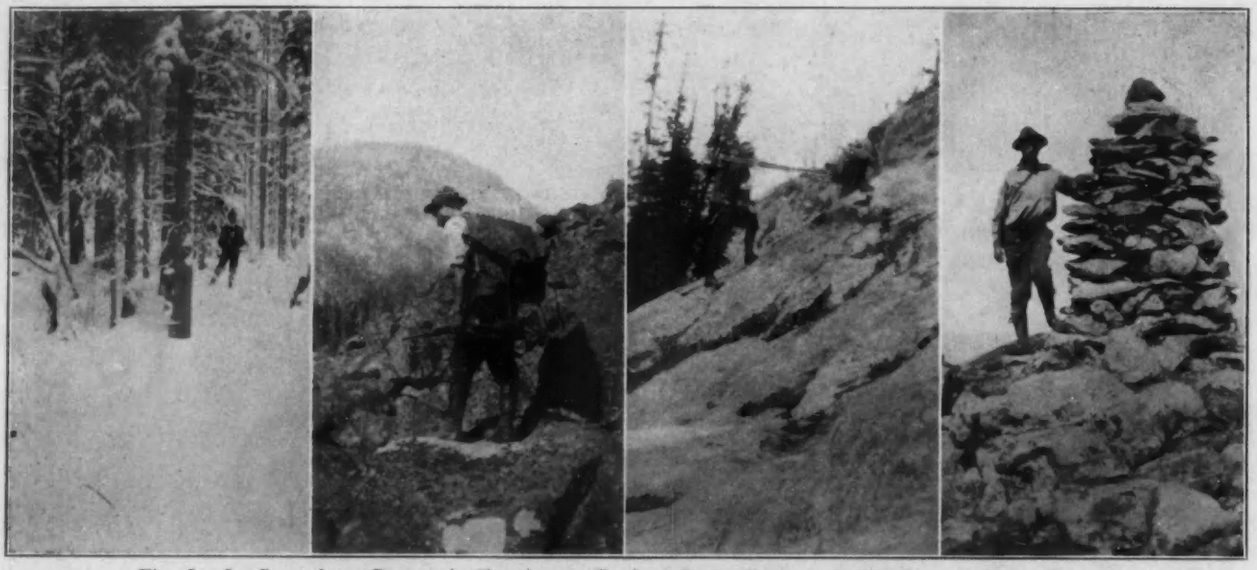

Fig. 7. On Snowshoes Reservoir Hunting, a Typical Pack, Some Stiff Climbing and the Top of Mt. Lolo, Missoula's Weather Barometer.

wasteful habit of figuring 1 in. of water to be necessary to irrigate an acre of ground. By careful experiments at the Agricultural College at Bozeman, however, it has been found that two-fifths of a miner's inch per acre properly applied is more than ample. Two-fifths of a miner's inch of water flowing through the irrigation season will cover an acre of land approximately 2½ ft. deep. Hence the term two-fifths of a miner's inch per acre of the natural stream flow and 2½ acre feet of flood rights are practically one and the same thing.

In estimating the necessary storage to be acquired per acre of arid land it is considered by good authorities that if 1 acre foot of storage per acre is allowed and this, combined with part of the flood rights in an average Bitter Root Valley stream will be ample for orchard purposes.

After locating on the flood rights of the stream the next step as a rule is to see what the chances are of making cheap storage on the stream. It is to be remembered that the acreage to be irrigated as a rule usually lies between 200 to 400 acres, consequently nothing but the most economical kind of construction work is possible, for the costs soon become prohibitive when figured on costs per acre, which is the final test to be applied before the work is undertaken. To meet the common practice in the valley, the entire installation, consisting of dams, ditches, headgates, rights-of-way and everything complete, is reasonable if under forty dollars per acre, but is absolutely prohibitive if above sixty to seventy dollars per acre.

In the location of main canals and laterals up to a capacity of 25 sec. ft., a grade of 5.28 ft. per mile for main canal and 10.56 per mile for lateral is found to be best suited for the decomposed granite soil of the Bitter Root valley. In many cases it is not possible to give such grades as this. In fact, in the location of a canal below Missoula known as the Grass Valley ditch, taking water from the Missoula river and distributing it fifteen miles below, a grade as low as ½ ft. per mile was found absolutely necessary in order to raise water where desired. The soil here was not decomposed granite, however, but a clay admixture, and consequently seepage losses slight.

The headgates are usually built in log cribs filled with rock. A favorite design in the valley is to have two gates, one for supply control and one at the immediate out-take, known as the "storm-gate." This storm-gate is not watertight, but is so built as to drain the stream entirely in low water and yet to bear the brunt of the high-water onslaught without damage. Fig. 3 is a typical illustration of a storm-gate.

The main canals are usually from 5 to 6 ft. across the bottom, 2 to 3 ft. deep, and have side slopes of 1 to 1. A variation from 1 to 1 slide slope is very unusual. In the hillside work encountered many prefer the carrying portion of the ditch to be entirely in virgin soil. As a consequence the locating engineer usually designs the lower side of the ditch so as to have a constant cut of say 2 ft. This gives rise to simplified computation of yardage, and will be illustrated later.

Flumes are built largely of wood, but the Maginnis steel flume has been found most successful in operation and is gaining in favor among the newer installations.

Fig. 8. Old Bruin Opposes Reservoiring Operations, a Glimpse of the Most Difficult Surveying on Record—Montana-Idaho Boundary, Lake Coquina—Idaho, Clearwater and Lolo Hot Springs in Dead of Winter.

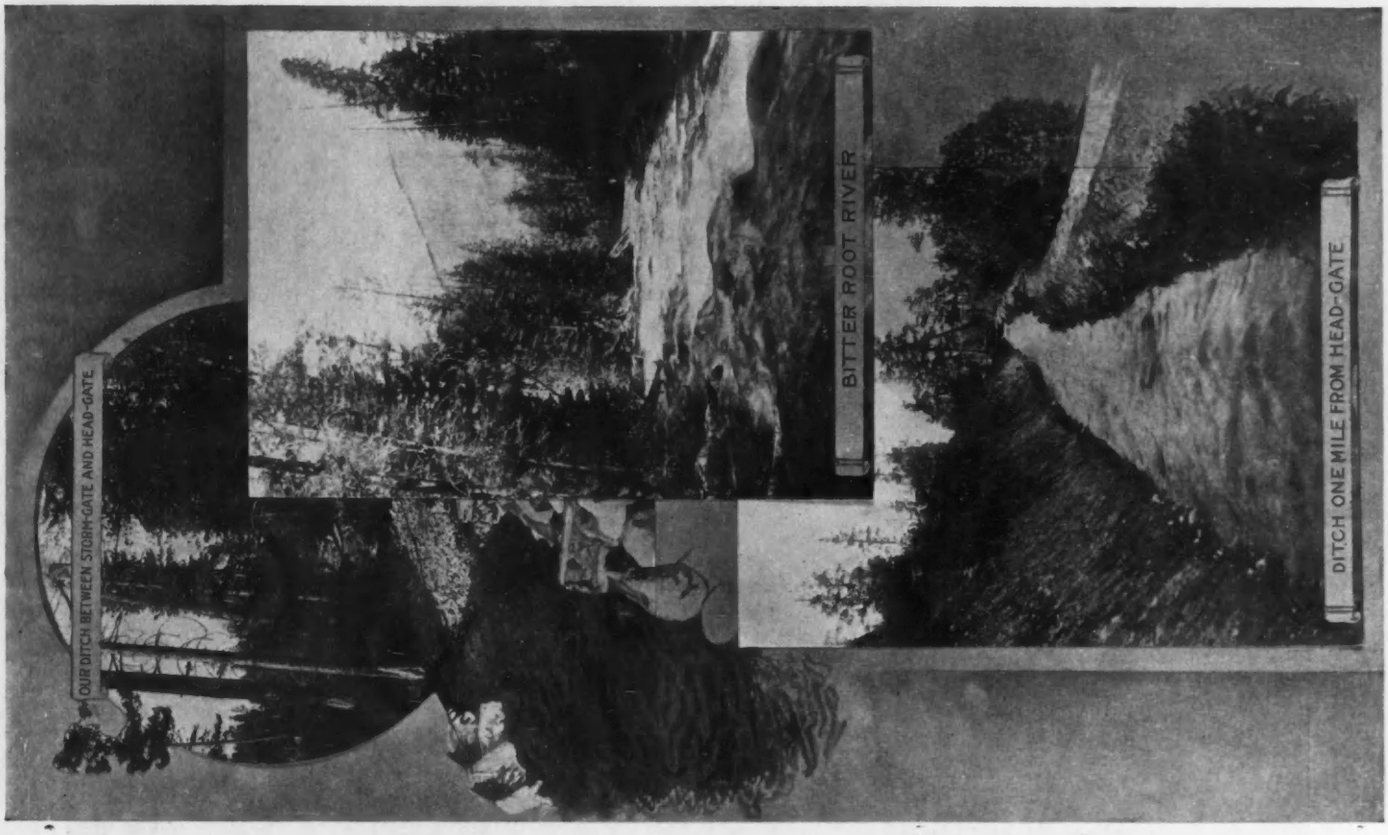

Fig. 11. Irrigation System of The O. W. Kerr Co., Bitter Root Valley.

Fig. 9. Typical Orchard Scene Bitter Root Valley.

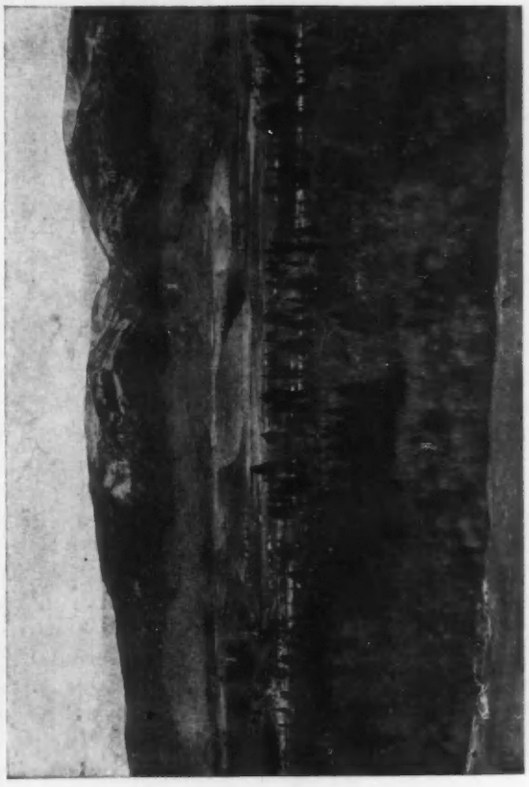

Fig. 10. Distant View of Snow-clad Bitter Root Range.

Fig 12 is an illustration of a stretch of Maginiss steel flume installed for the Bitter Root Stock farm which has proved highly satisfactory.

In order to make a successful trip into the heart of the Rockies in search of reservoir sites many things usually of small importance loom up as gigantic obstacles. It may be that the proposed exploration is to take place up a canyon where a well-beaten trail is situated. If so, the task is much simpler than if a trip is proposed in a canyon gorge filled with fallen timber, slide-rock, and every conceivable impediment without the least sign of a trail or means of clearing one.

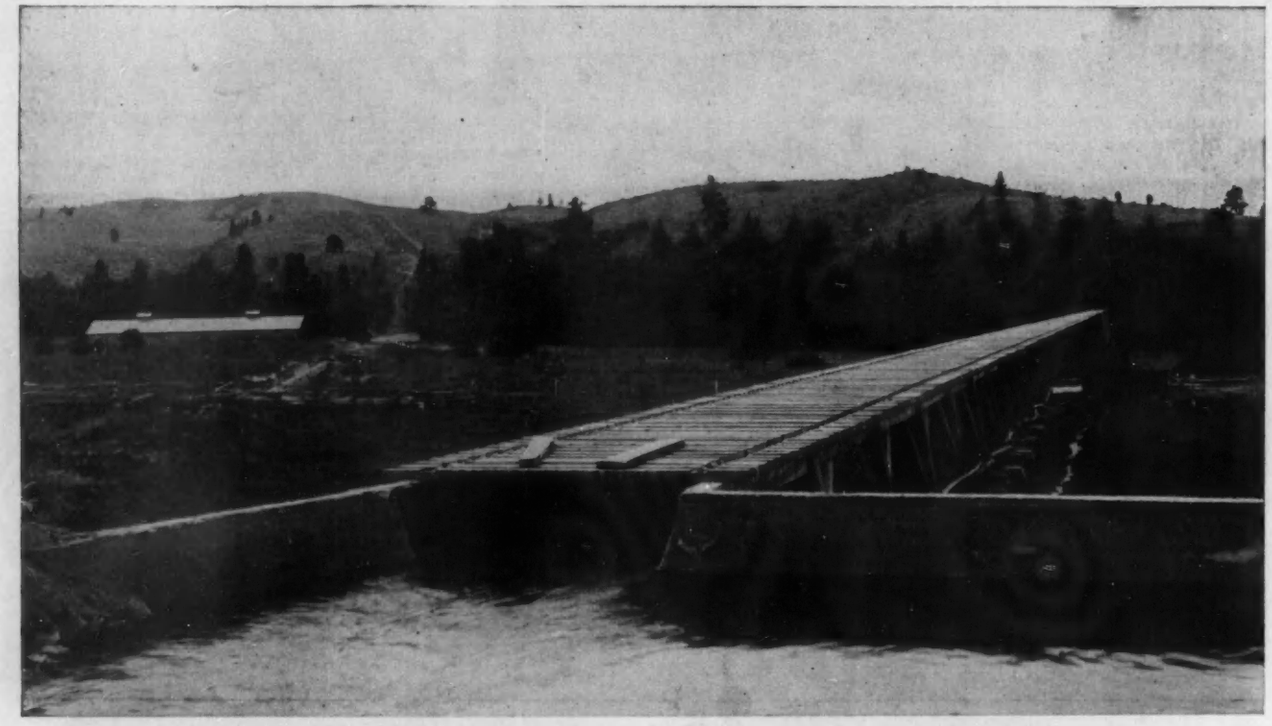

Fig. 12. Maginiss Steel Flume Installation in Bitter Root Valley, owned by the Ravalli Land & Irrigation Co., Hamilton, Montana. Flume shown is 2468 ft. long, has top diameter 8 ft. 10 in., and under a grade of 1 ft. per 1000 will discharge 184 cu. ft. per sec.

In either case each member of the party, and as a rule there are three, should have a supply of matches in absolutely watertight case, a hand-axe and a pocket transit or "Brunton." In addition, in the wilds of Western Montana, it is a good piece of wisdom for one member to pack a rifle and the other two to have revolvers strapped to their belts. Thus equipped, one is in a fair way to have heat and food if a hasty retreat is necessary, or if the members get separated distress signals can be heard.

In case the trip is to be made a-foot over rough country, as is usual in trail-less mountain canyons, each member must pack his share of the burden. A pack as indicated in Fig. 7 has been found by the writer to be the most convenient. With this arrangement three of us have packed blankets and supplies sufficient to last us for three weeks.

As stated above, the trip is rosier if on a trail and pack horses can be used. In case pack horses are available the usual query arises as to who can throw the "diamond" hitch. This is a most important accomplishment and should be mastered by everyone anticipating pack trips into the mountains. I once heard of a gentleman who was endeavoring to journey a long way into the mountains but did not know how to throw even the "squaw" hitch, but just wound his blankets over the horse and then wound a rope around and around the horse's belly. During the first day's journey he met a prospector coming down the trail who had his pack tied in a neat "diamond." The old prospector was invited to supper, and in the course of the evening the drift of conversation finally shifted to "packs" and "hitches." The old prospector proved a walking encyclopedia in this specialized subject. He explained with such minuteness the intricate windings of the "diamond" and "double diamond" that our gentleman friend decided to attempt it the next morning. The prospector, ever seeking for knowledge in his knot-tying hobby, told the old gentleman he would not oversee the job unless he first demonstrated the manner in which he had packed in thus far. The old gentleman quickly acquiesced and inwardly chuckled, for he saw visions of triumph that would come when he should ask the evident all-authority on hitches, the particular name of his hitch, for he knew there was none. After he had rolled the blankets over the horses back and under his belly, he then proceeded to wind and wind the rope around the horse, but hardly had he made the finishing touch when he was interrupted by an explosion from the prospector: "Wal, wal, I ain't seen the 'Oregon grape-vine' since I packed in twenty year ago for old Prof. Shelhorn, when he was studying botany in the Kootenai."

To come back seriously to the subject of packing, it has been the universal experience of every engineer whose sphere of activities leads him into a mountainous country necessitating packing in on horses that,

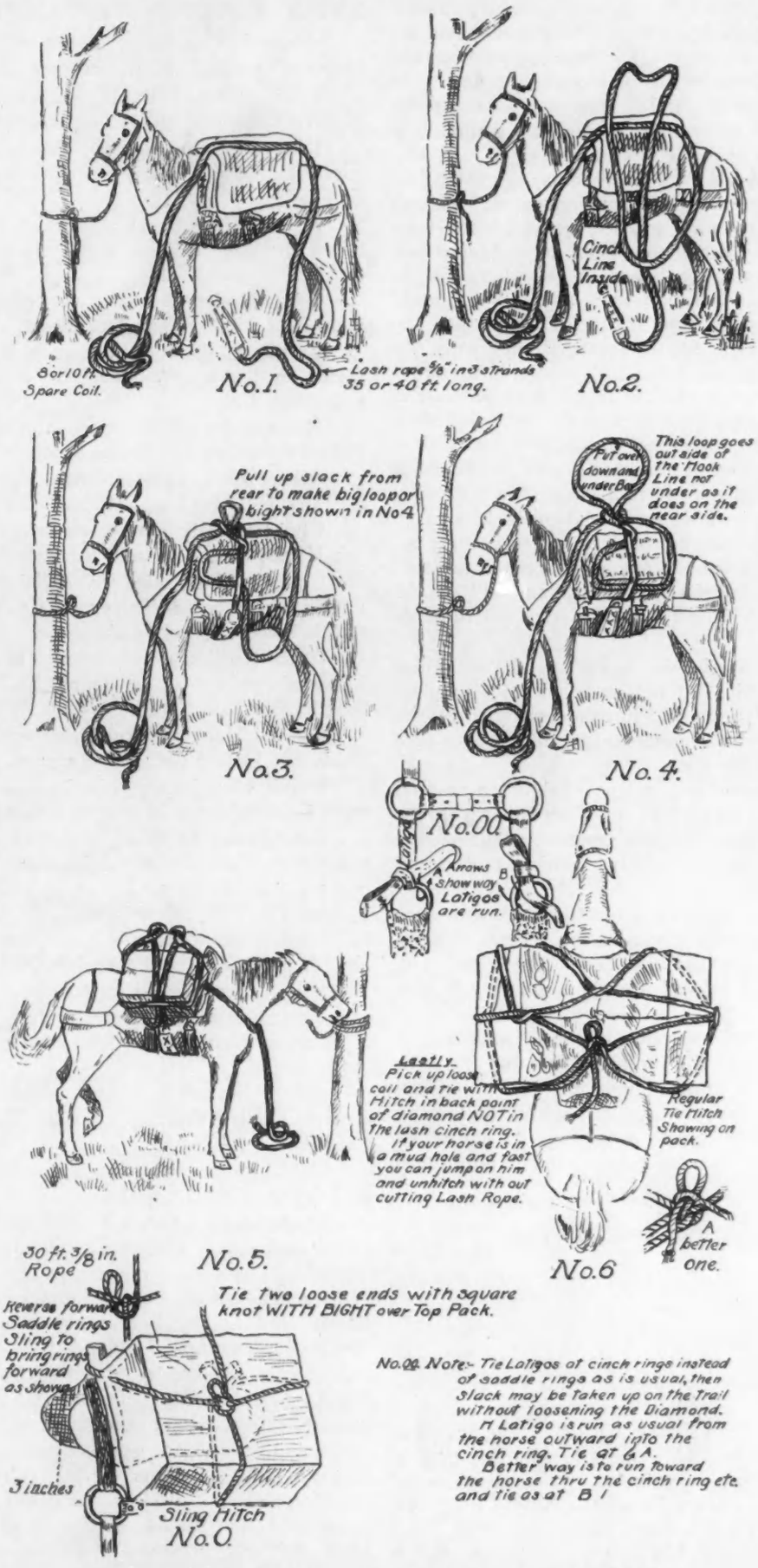
8 or 10 ft. Spare Coil.
No. 1.
Lash rope 5/8" in 3 strands 35 or 40 ft. long.
Cinch Line Inside
No. 2.
Pull up slack from rear to make big loop or bight shown in No 4
No. 3.
Put over down and under Bar
This loop goes out side of the Hook Line not under as it does on the near side.
No. 4.
No. 00
Arrows show way Latigos are run.
Lastly. Pick up loose coil and tie with Hitch in back point of diamond NOT in the lash cinch ring. If your horse is in a mud hole and fast you can jump on him and unhitch with out cutting Lash Rope.
Regular Tie Hitch Showing on pack.
A better one.
No. 6
30 ft. 3/8 in. Rope
No. 5.
Tie two loose ends with square knot WITH BIGHT over Top Pack.
Reverse forward Saddle rings Sling to bring rings forward as shown
3 inches
Sling Hitch
No. 0.
No. 00. Note- Tie Latigos of cinch rings instead of saddle rings as is usual, then slack may be taken up on the trail without loosening the Diamond. If Latigo is run as usual from the horse outward into the cinch ring. Tie at 6 A. Better way is to run toward the horse thru the cinch ring etc. and tie as at B 1

Fig. 13. Detailed Method of Throwing the "Diamond Hitch."

although the various hitches in use, including the so-called "squaw" hitch are a matter of common knowledge, yet one is thoroughly impressed with how uncommon this knowledge is when we are put right up against the problem of securing a packer to properly prepare the horses for a dangerous mountain trail.

Some three years ago there was a sudden demand for large numbers of pack horses and packers to take surveying crews into the great Idaho clearwater over to the west of the Bitter Root Mountains. A location war was on between the Northern Pacific company and the Harriman lines as to who should control the Lolo pass from Idaho into Montana. So great was the demand for packers that they were obtained with difficulty, consequently some of the engineering force were assigned to this august post. Orders were issued and each pack train furnished with a blue print of the "diamond" hitch as illustrated in this article. It proved of immense service in the quick dispatching of supplies. It is a good plan for every practicing engineer whose duties call upon him to go into a country necessitating pack trains, to get out behind the barn and master one good secure form of hitch for packing, preferably the "diamond" or the "double-diamond," if he desires to pack instruments at any time.

The illustration shown in Fig. 6, shows a diamond properly made, but not sufficient care in placing the level rod upon the horse, consequently the rod was broken by the horse running into a tree at a narrow passage in the trail.

The third illustration, in Fig. 7, shows a method of rolling blankets and packs for a severe trip into a very inaccessible country. The equipment thus packed on shoulders allows the highly furnished camping apartment shown in Fig. 4.

The method of pitching a tent by cross-arm supports for the ridge-pole shown in the second illustration in Fig. 4, is convenient and thoroughly safe, although not so artistic as upright support and side lashes.

Finally, it is the mastering of the little details of camp life that make all the hardships bearable and with these mastered, the engineer is not only able to become an expert in reservoir hunting, but withal finds time to commune with the great unfoldings of nature en route, an enjoyment so unique and exquisite only those who have experienced it can tell.

HORSEPOWER DEFINITION.

BY A. I. E. E.

In view of the fact that a horsepower defined as 550 foot-pounds per second represents a power which varies slightly with the latitude and altitude (from 743.3 to 746.6 watts) and also in view of the fact that different authorities differ as to the precise value of the horsepower in watts, the Standard Committee has adopted 746 watts as the value of the horsepower. The number of foot-pounds per second to be taken as one horsepower is therefore such a value at any given place as is equivalent to 746 watts; the number varies from 552 to 549 foot-pounds per second, being 550 at 50 deg. latitude (London), and 550.5 at Washington.

NEWLY-ELECTED WESTERN MEN A. I. E. E.

The following western men were elected as associates in the A. I. E. E., on June 27, 1911:

Louis Samuel Baird, engineer, Adams-Bagnall Electric Company, 600 Huron Road, Cleveland, Ohio.

Robert Almon Balzari, salesman, Westinghouse Electric & Mfg. Co. 165 Second street, San Francisco, Cal.

James Milne Barry, assistant, underground electrical distribution department, Pacific Gas & Electric Co., Sacramento, Cal.

John Wesley Bowdle, superintendent of equipment, San Diego Home Telephone Co., San Diego, Cal.

Frank J. Brann, construction foreman, Ford, Bacon & Davis; residence, 3724 Army street, San Francisco, Cal.

Howard Edwin Brillhart, station foreman, Great Falls Power Co., Anaconda, Mont.

Albert F. Cooke, electrical engineer, Mt. Hood Railway & Power Co., 604 Lewis Bldg., Portland, Ore.

Clyde Lindsly Davis, electrical engineer, Tonopah Mining Co., Tonopah, Nev.

Clarence Earl Fleager, division plant engineer, Pacific Telephone & Telegraph Co., 86 West Mission street, San Francisco, Cal.

Arnt Jacobsen, electrical machinist, Seattle-Tacoma Power Co.; residence, 1017 Jefferson street, Seattle, Wash.

Samuel Macaw Kennedy, general agent, Southern California Edison Co., Los Angeles.

Frank Earl Marcy, district manager, Allis-Chalmers Co.; residence 74 P street, Salt Lake, City, Utah.

John James Marshall, assistant superintendent of machinery, United States Mint, San Francisco, Cal.

Hammond Mathews, chief electrician, Arizona Copper Co., Clifton, Arizona.

Louis Clifford McIntosh, assistant manager, Southern Pacific General Telegraph, 488 Pacific Electric Bldg., Los Angeles, Cal.

Thomas McLean, meter tester, Los Angeles Gas & Electric Corporation, 645 South Hill street, Los Angeles, Cal.

Albert Franklin Menzel, construction foreman, General Electric Co., Nevada Bank Building, San Francisco, Cal.

T. G. Quinn, superintendent, Alaska Water, Light & Tel. Co., Valdez, Alaska.

Frederick P. Rawson, electrical engineer, Mt. Hood Railway & Power Co., 608 Lewis Bldg., Portland, Ore.

George Walter Shaver, engineer, Westinghouse Electric & Mfg. Co., 165 Second street; residence, 1032 Thirty-third avenue, Oakland, Cal.

Charles Alexander Turner, electrical engineer, Pacific Telephone & Telegraph Co., 140 New Montgomery street, San Francisco, Cal.

Erle Leroy Veuve, consulting engineer, 693 Pacific Electric Bldg.; residence, 177 Ardmore avenue, Los Angeles, Cal.

Markham Cheever, in charge of chief engineer's office, Telluride Power Co., Provo, Utah.

THE ELECTRICAL PRECIPITATION OF SUSPENDED PARTICLES.[1]

BY F. G. COTTRELL.

The removal of suspended partcles, from gases, by the aid of electrical discharges is by no means a new idea. As early as 1824 we find it suggested by Hohlfeld as a means of suppressing ordinary smoke, and again a quarter of a century later by Guitard. These suggestions, which do not seem to have stimulated any practical study of the question, were soon entirely forgotten and only brought to light again by Sir Oliver Lodge many years after he himself had independently rediscovered the same phenomena and brought them to public attention in a lecture before the Liverpool Section of the Society of Chemical Industry, November 3, 1886.

plied to a suspension the action consists for the most part in an agglomeration of the suspended particles into larger aggregates out in the body of the suspending medium and a consequently more rapid settling of these aggregates under the influence of gravity.

Alternating current may thus be used to advantage where the masses of gas or liquid to be treated are fairly quiescent and a simple agglomeration of the suspended particles into larger aggregates is sufficient to effect separation by gravity or otherwise.

In the case of the large volumes of rapidly moving gases in smelter flues the agglomerating and settling process is, however, too slow even when the flues are expanded into as large dust chambers as are commercially feasible. It is in such cases that direct current methods have been particularly important.

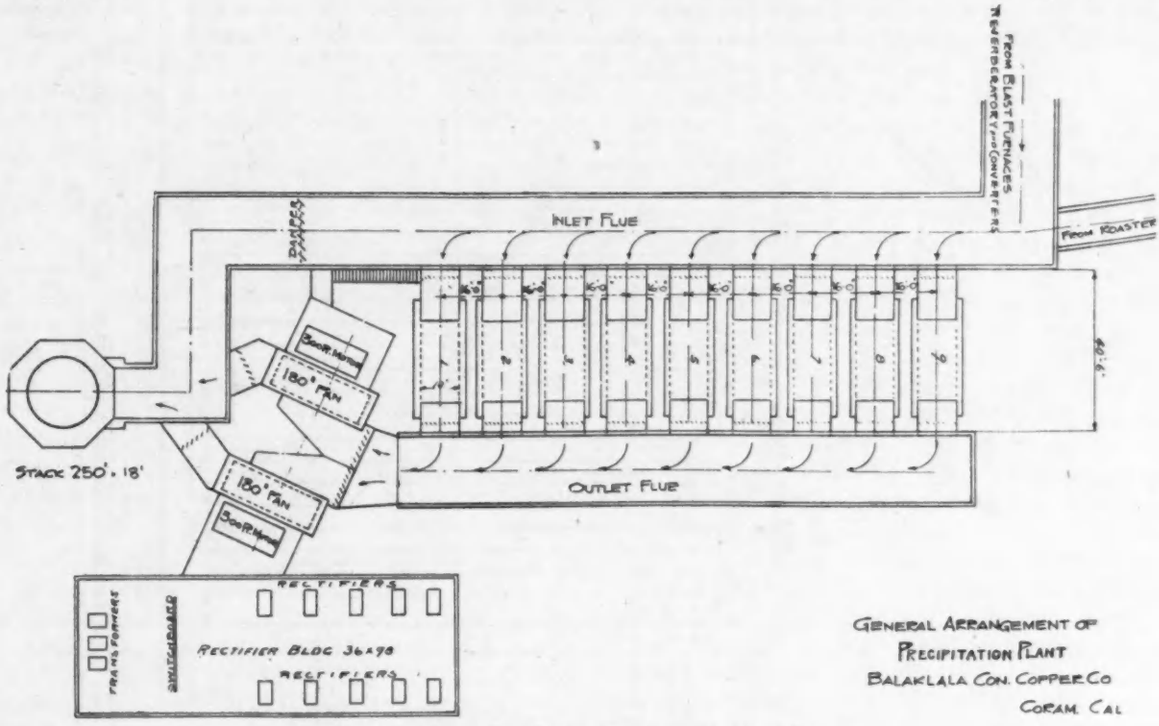

Fig. 1. Plan of Nine Electrical Precipitation Units.

Some four years ago while studying various methods for the removal of acid mists in the contact sulphuric acid process, the author had occasion to repeat the early experiments of Lodge and became convinced of the possibility of developing them into commercial realities. The work described in the present paper may fairly be considered as simply the reduction to engineering practice as regards equipment and construction of the fundamental processes long since laid open to us by the splendid pioneer work of Lodge, a feat vastly easier today than at the time of Lodge and Walker's original attempt.

The precipitation of suspended matter whether in gases or liquids may be accelerated by electricity in the form of either direct or alternating current, but the mode of action and the type of problem to which each is best applicable differ in certain important respects.

Where an alternating electromotive force is ap-

The Balaklala, or First National Copper Company, is the most recent of the Shasta County smelters, having blown in its first furnace in 1908.

These smelters are all situated in the narrow precipitous canyon of the upper Sacramento River and its tributary, the Pitt. The region itself is too steep and rocky for agriculture but was once heavily wooded, although now swept bare of vegetation for miles. As far as the canyon itself is concerned probably all the damage possible has already been done unless reforestation were undertaken. This latter even would probably be slow and difficult work as since the loss of vegetation the steep hillsides have been washed bare of soil for miles around. At Redding, however, some thirteen miles below Coram and seventeen miles below Kennett, the canyon widens out into the fertile Sacramento valley and from this point southward for some twelve miles further lies the region from which for the past two years have come increasingly insistent complaints against the smelters. These culminated a little over a year ago in agreements between the farmers and the

[1]Abstracted from The Journal of Industrial and Eng. Chem., August, 1911.

smelters under which friendly suits were brought in the federal courts and injunctions issued by stipulation requiring the smelters to remove the suspended matter from their exit gases and dilute the latter to such an extent that their sulphur dioxide content should not exceed seventy-five hundredths of one per cent by volume as discharged from the stacks, with the further general and sweeping provision that they should do no damage.

Fig. 1 is a plan of the nine electrical precipitation units or chambers in their relation to the flue system and stack. It should here be noted that the two large fans indicated in the drawing are not required for the operation of the precipitating system nor to overcome any added resistance due to its introduction, as this latter is very slight indeed. The fans were made necessary by that section of the court's decree requiring dilution of the sulphur dioxide to three-quarters of a per cent or less. When the furnaces are running on a high sulphur charge this feature of the decree necessitates a considerable dilution of the gases with fresh air and corresponding diminution of stack draft. At these times the fans are operated, but during a considerable portion of the time the sulphur dioxide in the gases can be brought low enough without interference with the draft, and during these periods the fans are stopped entirely although the gases still pass through them.

At the rectifier building the current is received from the companies' three-phase power circuit at 2300 volts, 60 cycles, and after being transformed up to from 25,000 to 30,000 volts under the control of the operator through variable resistance and induction regulators is rectified into an intermittent direct current as aleady explained and distributed to the individual preciptating units.

Fig. 2 shows a cross section through one of these units or precipitating flues as first installed. The double vertical lines represent the collecting or grounded electrodes each 6 in. wide by 10 ft. high made of No. 10 sheet iron. The dotted lines represent the discharge electrodes consisting of two iron wire strands between which is twisted the discharge material, for which both asbestos and mica preparations have been used in this plant. Each unit contains 24

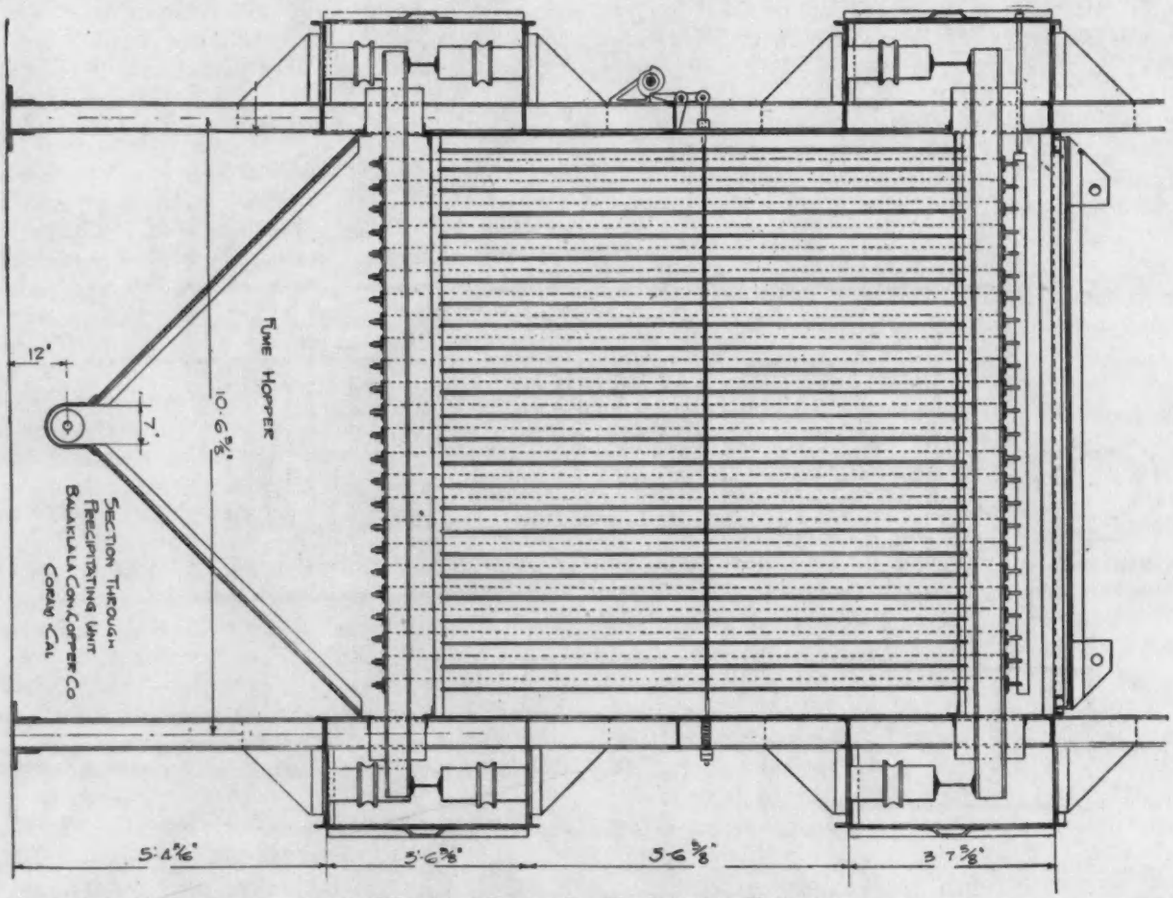

Fig. 2. Cross-section Precipitating Unit.

rows of 24 electrodes of each type. The collecting electrodes are carried by bars connected directly to the frame of the chambers themselves while the discharge electrodes are spanned by springs between a system of buss bars carried on externally placed insulators as shown in the figure. To the auxiliary chambers surrounding these insulators a small regulated amount of air is admitted to prevent conductive dust or fume from working back and settling on the insulators.

The cam and haker rod extending across the middle of the unit was originally designed for the purpose of vigorously shaking the electrodes as it was greatly feared that the removal of precipitate from the electrodes in units of this size might be one of our most serious problems. In actual operation it has been found however that the electrodes can easily be shaken by hand from the top entirely free from dust, the whole operation including cutting the unit in and out of the

system and the removal and replacement of its covers requiring only about ten minutes, and this having to be repeated every six or eight hours, depending on the dust content of the gases. The precipitated dust and fume as it falls from the electrodes is carried by the conveyor in each unit to a common longitudinal conveyor which in turn discharges into cars carrying it away for treatment and recovery of its values.

Filtration tests show that this plant under favorable working conditions precipitates between 80 and 90 per cent of the suspended matter in the gas, the average over the whole period of operation to date being somewhat less. Under present operating conditions at the smelter this represents some six to eight tons of precipitate per 24 hours.

The gas treating plant as a whole including flues, fans, motors and electrical apparatus cost up to the time it was first put in operation a little less than $110,000. Although many minor changes have since been made none of the larger or more expensive elements of construction have been greatly altered.

The total average power consumption for the precipitation plant at present is in the neighborhood of 120 kw. One man can readily control the whole operation in the rectifier house although as a matter of precaution for a new plant under the high tension here used two have usually been on duty. Two laborers and a foreman are employed on the precipitating units and dust-handling system, although this can probably be reduced somewhat by automatic shaking devices, since as yet the main efforts at improvement have been directed elsewhere.

The volume of gases to be treated varies considerably with the conditions at the furnaces, but at present may fairly be taken as averaging between 200,000 and 300,000 cu. ft. per minute, and entering the units at from 100 to 150 degrees C.

One of the greatest difficulties met with in this particular installation has been the maintenance of conductivity in the fine fibers of the asbestos and mica of the discharge electrodes. At ordinary room temperatures these materials readily take on enough moisture from the air to afford sufficient surface leakage for all the discharge necessary, and the same is true at higher temperatures if the gases contain traces of sulphuric acid or other conductive matter, but in the particular gases here met with the high and variable amount of zinc oxide at times robs them of all conductive matter, thus reducing the conductivity of the fibres of the electrodes and seriously effecting their efficiency. The possible methods of overcoming this and giving the fibers a permanent conductivity of their own as well as other details of the more purely electrotechnical matters underlying the whole process will be treated more at length elsewhere as the present article is intended more as an outline sketch of the history and practical development of the work thus far accomplished. Nor is this the place to speculate upon the final outcome of situation between the farmers and the two great smelting plants which have adopted the remedial measures above described, for this is in the end a question for the botanical and agricultural expert, as to whether or not, or to what extent actual damage is still being done, no matter whether this comes from suspended matter or from the sulphur dioxide, which neither the bag house nor the electrical precipitation make any claim to remove. The two smelting companies have done and are doing everything in their power to better the conditions while on the other side the farmers, through the executive committee of their protective association, have earnestly tried to carry out their part in a spirit of fairness to all concerned.

To those who know the circumstances of the many bitter conflicts between farmers and smelters all over this country, with the attendant expense and usual barrenness of results, the present developments in Shasta County present a very suggestive illustration of what may be accomplished in the technical development of our industries by spending the money on experiment and construction instead of all on litigation. Irrespective of the local issues involved the work done at both of these smelters during the past year has been a real and decided step forward in practical metallurgy. Both plants have already sufficiently demonstrated the applicability to large scale operation of the principles underlying them to ensure these principles finding a permanent place from now onward in the field of engineering, and each for the particular cases for which it is peculiarly adapted. Before us, of course, still looms the question of the sulphur dioxide and the solution for this on an equally large scale is unfortunately not yet clearly in sight.

Of the other possible applications of the process, one of the most recent to be actively prosecuted is the collection of dust from Portland cement kiln gases. The chief stimulus to this development has again been the nuisance to the surrounding population and its attendant litigation. This has been especially acute in Southern California where several cement plants are located in the heart of an exceedingly rich orange country. In the case of the Coulton plant with a capacity of 2500 barrels a day an injunction has already been issued by the court which, if sustained, will close the plant, unless they can control their dust, which the court estimates at present at some 20 tons per day. This case differs from that of the smelters in that here there is no question of damage from gases but merely the deposition of a large tonnage of impalpable dust of lime and clay.

From the technical side a new condition is here met with in the high temperature of the gases to be treated, which are 450 degrees C. and upwards as they leave the present stacks. The dust itself is furthermore entirely devoid of electrical conductivity, but notwithstanding this it is easily and completely precipitated by the electrodes when these are properly adapted to the new conditions.

Another extensive field in which it is hoped this process may find useful application is the cleaning of iron blast furnace gas for use in gas engines. Outside of the poisonous and combustible nature of these gases and the consequent necessity for keeping the whole apparatus gas-tight there would appear to be no new difficulties here to overcome and steps are being taken to thoroughly test the matter on a practical scale, this work at present being in direct charge of Mr. L. L. Johnson of Indianapolis.

A question which naturally presents itself is whether this work has any bearing upon the coal smoke problem of large cities. In answer it may be said that for the great majority of cases at present the more logical line of attack would seem to lie in improved methods of combustion, to avoid making smoke in the first place, but in some special instances where such methods may happen to be particularly difficult of application and the suppression of smoke is especially desirable, electrical precipitation may eventually be found of us ', for experiments show that it acts upon ordinary smoke in essentially the same manner as upon the fumes and dust above discussed.

Note Received July 7, 1911.

Since the manuscript of the above article was sent to the printer the case of the Balaklala Company vs. the Shasta farmers has come up for formal hearing in the United States Circuit Court in San Francisco, before Judge Morrow, on June 19th.

The evidence presented from the farmers' side consisted of a considerable number of affidavits from individual residents of the district in question, stating that they believed damage was still being done. They naturally made little or no attempt to distinguish between damage from gases and that from suspended matter. Of much more interest in the present connection was the report from Messrs. Gould and Burd, the chemists employed by the Shasta County Farmers' Protective Association, to examine the operating conditions at the smelter itself and determine to what extent the terms of the decree were being fulfilled.

Their tests extended over the period from March 10th to April 3d and credit the electrical apparatus with removing during that period an average of 72.8 per cent of the total solids in the gases entering it. In nearly one-third of the individual determinations the removal of solids reported is over 85 per cent.

They report the average concentration of sulphur dioxide as 0.56 per cent by volume, but state that several times during the month the concentration rose slightly above the 0.75 per cent prescribed as maximum by the court.

The outcome of the hearing was the entering of a judgment by agreement and stipulation between the contesting parties whereby the plant is allowed thirty-five days under existing conditions in which to run through the ore on hand, but is then required to close down completely until such time as it can live up to the letter of the original decree, viz., remove all solids, never exceed 0.75 per cent sulphur dioxide and do no damage.

During the time in which the plant still remains in operation experimentation and development is being carried on as vigorously as ever, but it is scarcely expected even under the most favorable conditions that a shut-down can be entirely avoided. During such shut-down, however, the progress of the work at other plants already undertaken thoroughly insures the uninterrupted development of the process in general.

The Panama-Pacific Exposition, San Francisco, 1915, means commercial supremacy for the West. If you never thought of this before, explode a keg of dynamite and wake up.

BILLIARD TABLE LIGHTING.

BY F. W. LOOMIS.

In looking over the lighting systems for billiard and pool tables in service at clubs, hotels and public billiard rooms it is surprsing to see how abominably the majority of tables are illuminated.

In many rooms one sees the old four light fixture still in service, the lights placed in a form of a cross—two arms of fixture running the length of, and two across the center of table, with lamps in horizontal position and but partially shielded. The corners of the table are usually most inadequately illuminated.

Again a system is used where three lights are placed over the center of the table's length, usually covered with a non-reflecting material such as art glass. This system gives no distribution, but only a bright streak in the center line of the table. But we have all probably seen and noted the poorly lighted examples, so let us now give thought to how to improve on the faults.

Billiard and pool service requires about 4.0 to 5.0 foot candle intensity of local illumination evenly distributed over the surface of the table with a geneal intensity over the room of 0.8 of a foot candle.

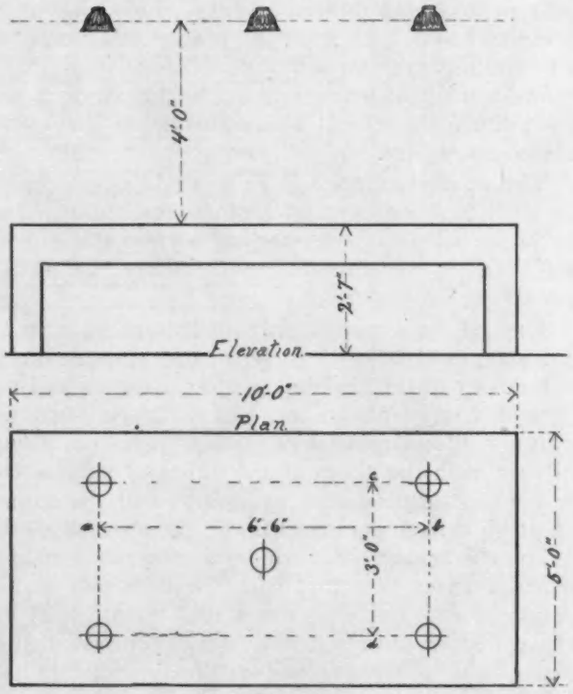

Fig 1.

Fig 1 shows a suggested system of five light sources properly spaced to give an even distribution of light using 32 candle power lamps. This is one of the most attractive systems from the standpoint of both appearance and evenness of illumination that has been devised, and for club, hotel and home service is most satisfactory. The system takes care of the general lighting of the room, and also gives the strong local illumination required over the table. It will be noted that the table shown is the standard 5 ft. by 10 ft. Should the 4¼ ft. by 9 ft. table be used the spacing of units must be changed slightly. The dotted

line a-b should then be 6 ft. 0 in., while c-d is 2 ft 9 in., the mounting height of 4 ft. remaining the same.

The five light sources can be attractively linked together by a looped chain effect, while if so desired, an art glass envelope may cover each reflector. Of course, this system may be too expensive in a large public hall having many tables, consequently, scheme shown in Fig. 2 is submitted.

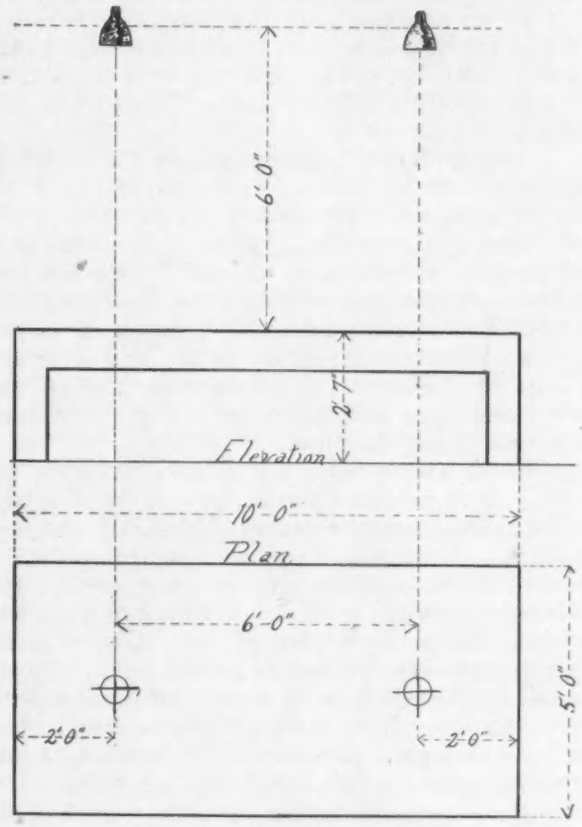

Fig. 2.

This plan calls for but two light sources over each table. Here 48 candle power lamps are recommended under steel reflectors. Augmenting this system, which is strictly for the local illumination, there should be some general lighting scheme of mild illumination over the balance of the room, preferably using glass reflectors. These general lighting sources should be placed well up toward the ceiling of the room.

The equipment recommended for Fig. 1 is as follows:

Five 40-watt bowl-frosted Mazda-tungsten lamps with form "O" (standard 2¼ in. shade holders) and E-40 satin finish Holophane reflectors. These may be used with or without art glass or other fancy envelope. This system will give an average intensity of 4.25 foot candles illumination over the playing surface of the table.

Equipment for Fig. 2 consists of two 60-watt bowl-frosted Madza-tungsten lamps, each covered by a Holophane D'Olier steel reflector AI-60. This will give an average intensity of 4.0 foot candles on the table. By lowering the units two feet (mounting height reduced to 4 ft. above table) two 40-watt bowl-frosted Mazda-tungsten lamps may be used with Holophane D'Olier steel reflectors AE-40. The results, however, will not be quite so good as the intensity will be reduced to about 3 foot candles. Also at 4 ft. mounting two 60-watt bowl-frosted Mazda-tungsten lamps may be used with form "H" holders and E-60 satin finish Holophane reflectors. These will give less than 3 foot candles intensity, however, though no other lighting will be needed for general effect. Where the (Fig. 2) two light system is used over a 4½ ft. by 9 ft. table the spacing between the light sources should be maintained.

CITY ABLAZE WITH MYRIAD LIGHTS.

BY R. M. WHITNEY.

One of the most brilliant electrical expositions ever given in the world, will be held in Los Angeles at Fiesta Park, November 25 to December 9, if the plans of the Executive Committee, selected from the representatives of Los Angeles electrical companies, do not go astray. Plans for the great show were launched at a dinner of the electrical men recently.

The committee selected at the meeting recently consists of H. B. Woodhill, chairman; C. S. Walton, vice-chairman; C. G. Pyle, secretary and treasurer; and J. E. MacDonald and T. E. Burger, associate members. The entire affair will be under the general management of D. M. Moses, who has had charge of similar expositions in other cities, and who gave the first automobile show ever held on the Pacific Coast at San Francisco in 1907.

Fiesta Park is to be overarched by a great canopy of waterproof canvass, and the poles will be covered with silks in which vari-colored lights will be embedded. More than 40,000 incandescent lamps will form only a portion of the illumination of the large tent. The 90,000 square feet of space will be divided by avenues and booths in which will be given demonstrations of every apparatus in the electrical world since the lightning was first stolen from the heavens, to the present time.

The railway companies have agreed to decorate their cars with extra illuminators during the two weeks of the show, and many business firms of the city will assist in adding special contributions to the brilliant affair.

"The show will probably cost close to $100,000," said Mr. Moses yesterday, "but it will be worth it, and more, to Los Angeles and to Southern California. Not only will the electric companies of this section be represented, but many of the large eastern concerns will purchase booths in the big tent. Fiesta Park, which we have selected, is one of the very best settings for such an exhibit I have even seen, either in this country or in Europe. There is no reason why this affair should not be held annually. Similar expositions have been going on every year in Chicago for eight years and in New York for the last six years. Boston, Denver, Minneapolis, Pittsburgh and San Francisco each held an electrical exhibit last year, and these cities will make them annual occurances. There could be no better city in which to hold such an exhibit and we intend to make it a success."

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Western Power Rivalry

It has recently been commented upon by the Financial World of New York that scarcely a week passes by but that either the Great Western Power Company or its rival the Pacific Gas and Electric Company makes some sort of a move against the other. The new financing by the Pacific Gas and Electric involving something like ten millions for extensions and improvements is now followed by an announcement that the Great Western Power is edging its way into cities and towns around San Francisco and selling power in territory heretofore considered to belong to the Pacific Gas and Electric.

It is patent that both companies are expecting great things of the Panama Exposition in San Francisco on which work has already begun. The people of the State are preparing for a veritable boom and it is to be an occasion to advertise the State which will be taken full advantage of. As a matter of fact, bids for the inflow of large amounts of foreign as well as additional American capital are now being made and response has been most gratifying. Both Swiss and French capitalists have betokened a lively interest in the possibilities of the State.

When it is considered that the great State of California is three times the size of the whole of England and yet has but seven per cent of England's population, we can in a small measure get an insight into the immediate future of this great commonwealth. The combined future power output of these two great corporations means a possibility of nearly three-quarters of a million horsepower, a sum almost too startling to comprehend, yet even more wonderful has been the unprecedented growth of the developed resources of this State during the past decade. No one would dare say there is not a strong possibility that before these power resources are fully developed the growth of the State will necessitate even more gigantic development over even longer distances.

Good Roads Activity

In the days of Roman supremacy in order that a revolution or insurrection might be quickly subdued by rapid transit of troops it became an absolute necessity from a military point of view to connect Rome with all parts of the Empire by perfect roads. These roads were constructed with such care for permanency that the old Appian Way and the many other similar public boulevards that gave rise to the adage "all roads lead to Rome" are still the marvel and admiration of engineers the world over.

During the next five years the entire West will be preparing to put itself on exhibit to the world and come into its own in the way of commercial supremacy. The way to capture commercial supremacy is to so prepare our natural exhibits that they will be accessible without too severe physical exertion. The final clincher that is to hold permanently in our country the admiring visitors of 1915 is, after they have seen the great exhibits of the fair, to show them our most substantial exhibit, the great undeveloped resources of the West.

The advent of the automobile has revolutionized

sightseeing. All the benefits that are derived from "seeing in order to believe" are acquired without the terrific physical strain formerly endured in getting an insight into the natural resources of a county. To give the automobile its full value we must improve our roads. For best results there should be a thoroughly good substantial highway beginning at the Yellowstone National Park in Montana; continuing thence through the Bitter Root Valley to the Flathead and the Glacier National Park; thence to Spokane, the Yakima and other sights of the Inland Empire; thence over the picturesque Cascades to Seattle and Tacoma; thence through the gigantic timber belt to Portland; thence southward through the scenic Rogue River country, past Mount Shasta, down the lovely Sacramento Valley to San Francisco; thence southward along the beautiful coast scenery to Santa Barbara; thence to the enterprising city of Los Angeles and southward to the San Diego exposition. Should such an enterprise be attempted with side roads to the Big Trees and the Yosemite Valley and the thousand other wonders of the West, it would undoubtedly meet with the hearty support of all the states through which it would pass, and if thoroughly advertised to the world it would unquestionably be patronized by thousands and result in a valuable widespread knowledge of the whole West.

The Western States are already alive to the keen necessity of improvement in roads. The Montana Good Roads Congress which convened at Helena on June 27th declared itself in favor of the proposed highway from the Yellowstone National Park to the Glacier National Park and recommended that courses be given in the technical schools of the State covering public road engineering features. In Idaho the Intermountain Good Roads Association met in convention at Pocatello, Idaho, on June 23-24, and recommended to Congress through their delegate, ex-Governor Brady, the passage of a bill setting aside one million acres of land in each State for the systematic development of public highways. The executive committee of the Oregon State Grange which recently met at Corvallis is in close touch with Governor West and is drafting two good road bills to be submitted to the voters of the State at the general election in November, 1912. In Washington the Pacific Highway Association is very active in promoting the subscription of thousands of dollars in road improvement throughout the State. In California hardly a day passes that we do not read of civic bodies in various conventions throughout the State declaring for better and more efficient roads. Desire for better roads is beating in the breast of every true Westerner.

Let us have uniformity and co-operation and the world is ours.

Smelter Smoke Nuisance

Elsewhere in these columns will be found an article dealing with the abatement of the smelter smoke nuisance and an account of some actual results accomplished. The question is of vital interest to the entire West. The past fifteen years have witnessed the spending of enormous sums of money in costly litigation, too often with no fruitful results credited to either side. The practical cases solved or partially solved in the article referred to, deal with California smelters but the cry of far-off Utah and Montana is often heard in these controversies.

In the past too much impatience is often shown on the part of the farmers to have an immediate abatement of the nuisance and on the other hand too much high-handed disregard on the part of the owners of the smelters in their attempts to scientifically solve the question. A new awakening seems to be gradually coming over both parties to the controversy. A few years back the owners of a certain large smelter, in fact a smelter in many respects the most powerful in the world, were sued for damages by farmers for miles around. The court awarded heavy damages and an abatement of the nuisance for the future. The owners in their efforts to meet the order of the court built a new smelter nearby and the design of the new stack was so large and was so powerful it was fully expected the evil effects of smelter smoke would be forever conquered. One of the up-holders of the smelter interests proudly prophesied that the dissemination of the smelter smoke would be so complete, due to the high velocity of the issuing gases, that the upper currents of air would distribute it over the whole surface of the earth similar to the phenomena subsequent to the explosion of Krakatoa in 1883. The explosion of this island near Sumatra was so severe, its effects were felt in London on the opposite side of the earth and small suspended particles in the upper air currents made brilliant sunsets in far off Africa. In their enthusiasm over the size and power of the new stack, farmers for miles around were invited by the managerial department to hold a dance, it is said, inside the big stack which measured over 105 ft. in inner circumference. Only a few years passed by, however, before the same old cry was heard on all sides, though this time from a wider area. It is evident then, the only solution that will be final will be the effectual removal of the obnoxious substances from the escaping gases.

In the issuing of an injunction by the court against the smelter if real damage has been done the farmer some good to him is undoubtedly brought about by the cessation of the nuisance. In this latter day thinking, however, the question must be carefully considered as to which is the greatest good to mankind, the great industry thus threatened or the curtailing of the output of a few adjacent farms. In the suit of the Deerlodge farmers of Montana against the Washoe Smelter, had the court granted the injunction, the greatest industry of the state would have been paralysed and thousands of people would have had to go hungry or seek employment in other states. Not only would the industry itself have felt the effect but practically every financial institution in the state would have suffered.

But the main question to be solved is how to arrive at a completely scientific means of handling the obnoxious gases. Great strides have been made in its solution in the past ten years. The problem will never be solved by injunction without allowance of liberal time for experiments on means of prevention. All great accomplishments have required time to bring them about. We read in the Good Book that to create the world six days were required by even the Almighty.

PERSONALS.

William Clayton, an official of the San Diego Electric Railway Company, is a San Francisco visitor.

W. S. Iliff of the United States Light and Traction Company of Denver, was a recent arrival at San Francisco.

George Hewitt Meyers, engineer with the United States Department of the Interior, arrived at San Francisco during the past week.

Charles B. Dixon, who has been associated for a long time with Thomas A. Edison at East Orange, N. J., is a recent arrival at San Francisco, en route to Honolulu, on a vacation trip.

A. C. Balch and W. G. Kerckhoff, of the Pacific Light & Power Company, came up from Los Angeles to be present at the recent festivities of the Bohemian Club at Bohemian Grove.

F. B. Gleason, manager of the Western Electric Company's Pacific Coast branch, left last Tuesday for a month's business tour of the East. He will attend the National Jobbers' Convention at Saratoga.

H. H. Sinclair, who has general supervision of the extension work of the Great Western Power Company, including the great impounding dam at Big Meadows, recently came up from his home in Southern California and visited the scene of operations.

George S. Hewins, one of J. G. White & Co.'s engineers, spent a day at San Francisco last week and then proceeded to the Big Creek watershed to make an investigation for the Big Creek Power Company with a view to installing two hydroelectric plants.

Sidney R. Inch, manager of the Missoula Light & Power Company of Missoula, Montana, left on August 16th for a visit to his home city, London, England. Mr. Inch has not been home for ten years, so that his sixty-day sojourn abroad has many pleasant anticipations, not the least among which is his anticipated visit with his former friend and instructor, Professor S. P. Thompson.

Robert Sibley, editor of the Journal of Electricity, Power and Gas, has been recently appointed by the Regents of the University of California, Associate Professor of Mechanical Engineering at the State University. Mr. Sibley will continue to direct the editorial work of the Journal.

Thomas Mirk, of Hunt, Mirk & Co., returned from San Diego to San Francisco last Monday after inspecting the work in progress for the San Diego Electric Railway Company. K. G. Dunn, electrical engineer with the firm, left on the same day for an extensive tour of the Pacific Northwest.

G. F. Chellis, an electrical engineer with J. G. White & Co., who is now at San Francisco, recently visited the San Joaquin power station in Crane Valley and supervised the starting of two new generating units. The San Joaquin Light and Power Corporation now has four units in operation at that point, with a total capacity of 20,000 h.p. They are ready to supply current for oil well drilling, irrigation, pumping, etc., in a large territory, through which their transmission lines are being extended. One of these lines will reach Los Banos, 125 miles north of the station.

J. Bumgarner is now superintendent of construction at the site of the Big Meadows dam of the Great Western Power Company. Preparations are being rushed for actual construction work. Good headway is being made on the installation of a special construction plant, which is to be entirely completed this fall. Two 350-kw., a.c. generators will be direct-connected to water wheels and will supply current for the operation of air compressors for drilling operations, electric cableway motors and concrete mixers.

ELECTRICAL CONTRACTORS' ASSOCIATION NOTES.

Seth Cohn of the Atlas Electric Company of San Mateo was in San Francisco this week.

Russ Wolden, president of the California Electrical Construction Company of San Francisco and San Jose, is enjoying a brief rest at Madrone Springs with his family.

W. S. Hanbridge has been elected secretary and treasurer of San Francisco District No. 1 of the California State Association of Electrical Contractors vice F. V. Meyers, who resigned in order to give his entire attention to his law practice. Mr. Meyers has been secretary for the contractors for a great many years and it was with keen regret that they accepted his resignation. As a token of their esteem Mr. Meyers was presented with a fine filing cabinet.

Noble Powell, director of Stockton District No. 8, was in San Francisco this week. Mr. Powell reports business rather poor in Stockton among the contractors on account of the electric company's method of wiring old houses free for five outlets and then charging for balance of work. The contractors fail to see why the power companies do not work in conjunction with the contractor, who pays a license, has an established place of business, carries a large stock, and is always called in except when something is being given away free.

John Rendles, president of the California State Association, has appointed the following committees, who will endeavor to bring about a more friendly feeling between the different branches of the electrical business, the intention being to make a careful study of the situation and endeavor to boost the others' game and have them boost ours:

Light and Power Committee—H. B. Woodill, Los Angeles; H. L. Miller, Pasadena; J. S. Reynolds, Santa Barbara; Phil Levy, San Francisco; C. V. Schneider, Sacramento; Seth Cohn, San Mateo.

Jobbers' Committee—"Chick" A mes, San Francisco; Frank Somers, San Jose; C. V. Schneider, Sacramento; G. E. Arbogast, Los Angeles; C. Loveday, Santa Barbara; C. L. Miller, Pasadena.

The directors for the coming year are: Q. R. Boynton, San Francisco; G. E. Arbogast, Los Angeles; C. V. Schneider, Sacramento; Carl Heilbron, San Diego; E. C. Wahelond, Oakland; A. P. Gaylord, Pasadena; J. S. Reynolds, Santa Barbara; Noble Powell, Stockton; Frank Somers, San Jose; Seth Cohn, San Mateo, Redwood and Palo Alto; Howard Ross, Riverside; O. Overhauser, Pomona; M. N. Phillips, Ventura.

In appointing his assistants for the year's work Mr. Rendles has selected a bunch of good hard workers and great things are promised for the coming year.

MEETING NOTICES.

A meeting of the Electrical Supply Jobbers' Association will be held at Portland, September 21, 22 and 23, 1911.

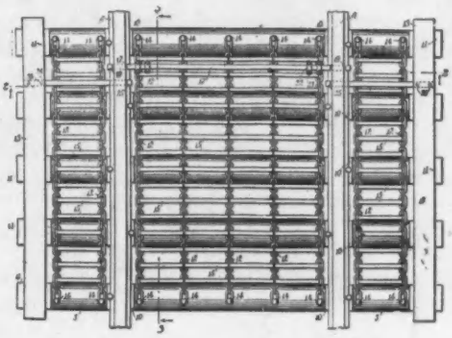
The Pacific Coast Gas Association will hold its nineteenth annual convention at Oakland, Cal., September 19, 20 and 21, 1911.

The Northwest Electric Light & Power Association will convene at Spokane, Wash., September 21, 22 and 23, 1911. A list of papers to be presented was published in this journal of July 22.

A meeting of those interested in technical advertising methods will be held at the Fly Trap restaurant, 73 Sutter street, San Francisco, August 21, during the noon hour. All publicity managers for machinery houses are cordially invited to attend this initial meeting which is planned to foster a closer co-operation between the technical press and its advertisers.

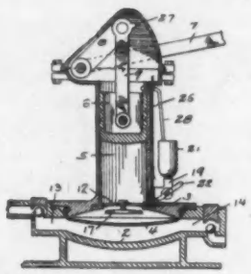
PATENTS

999,741. Railway Cattle-Guard Causeway. Samuel J. Billington and James A. Stephenson, Elliston, Mont. A railway cattle guard causeway, comprising a plurality of flexible members extended parallel with railway rails and fixedly secured at the ends of said causeway, said members permitting



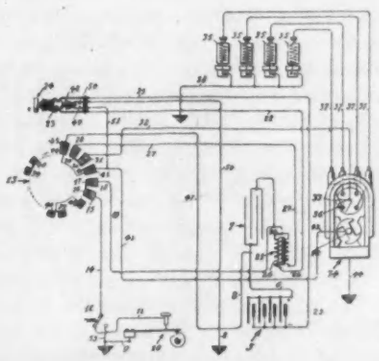
the flexure thereof to extend between the ties of said causeway; and rigid members extended between and connecting the said flexible members to form a latticework between the ends of said causeway.

999,832. Pump. Joseph Milburn, San Francisco, Cal. In a pump of the character described, a casing having its interior divided into two chambers by a diaphragm, a cylinder mounted on the casing, a spider provided with openings



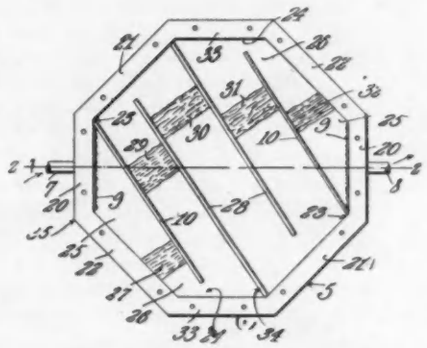
arranged between the cylinder and the casing, and a plate suspended from the spider adapted to be moved by the diaphragm to cover said openings.

999,894. Starting System for Gas-Engines. Harrison E. Slaughter, Los Angeles, Cal. A low tension starting system for explosion engines, comprising a low tension magneto, an electromagnetic spark plug, a battery, a step up coil for said bat-



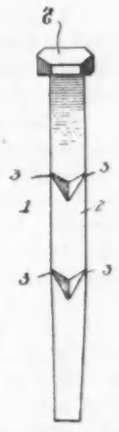
circuit passing through said spark plug and said magneto, an tery to produce an induced auxiliary current having a secondary winding connected with said spark plug, a magneto auxiliary battery circuit passing through said step up coil and said battery, a hand switch in said last circuit for opening said battery circuit to produce an induced current through said coil for actuating said spark plug, and a controller for controlling the circuits.

999,973. Gas-Purifier. John P. Farmer, Portland, Ore. assignor of one-fourth to Paul J. G. Kleppin and one-fourth to Joseph Wick, Portland, Ore. A gas purifier comprising a polygonal casing provided in its interior with spaced partitions extended in opposite directions, each partition being united with the casing in one of the interior angles of the casing and being extended into close relation to the interme-



diate portion of an opposite wall of the casing, whereby each of said walls will constitute a deflector to direct the gas into the angle formed by said wall and the next partition; there being a filtering material lodged between the partitions and in said angles; alined inlet and outlet pipes extended through opposite walls of the casing; each wall of the casing constituting a flat base upon which the casing may be successively supported, to permit the pipes to enter.

1,000,246. Railroad Spike. Emil Erikson, Emigrant Gap, A railroad spike provided with parallel sides, beveled front and rear faces and an overlapping head, the front and rear faces of the spike being provided with integrally formed pyramidal teeth, the said teeth being arranged in pairs upon the



opposite faces of the spike, the points of the teeth being positioned in a line with the sides of the spike, each of said teeth having its inner face inclined toward the face of the spike and its side or inner face beveled downwardly toward the central portion of the body of the spike to the point of juncture with the coacting tooth.

INDUSTRIAL

GAS-ELECTRIC CAR FOR SAN FRANCISCO RAILROAD.

The problem of producing a self-propelled car for railroad service, combining economical operation and luxurious comforts, has at last been solved.

The gas electric motor car with its reliability, low operating cost, flexibility of control combined with luxurious accommodations and freedom from cinders, smoke and coal gas, has found its place among railroads as a commercial success.

The six gas-electric motor cars which the St. Louis & San Francisco Railroad Company has purchased, are from the latest designs of the General Electric Company.

The cars are 70 ft. long and 10 ft. in width over the sills, with turtle back construction of roof, pointed front end and observation rear platform. The cars are designed with special reference to light construction with adequate strength. The interior arrangement is designed to meet the Southern traffic conditions, providing separate accommodations and entrances for white and colored passengers. The observation platform is unusually wide and is equipped with trap doors and brass railings, presenting a most attractive appearance. The windows are large, fitted with plate glass, and so arranged that they may be raised to a height of 17 in., allowing an unobstructed view. These are equipped with safety sash locks, anti-rattlers and weather strips. Each window is provided with a large fine mesh-copper, automatic screen running on metal guides. The window curtains are of pantasote of neat design and equipped with pinch handle fixtures.

The interior of the car is finished in a high grade of mahogany with paneling on the bulkheads. Each of the three compartments is provided with a saloon and drinking fountain. Electric fans are installed in each compartment.

The seats are of unusual length providing commodious accommodations for two persons and are amply large enough to seat three. These are of the stationary back type with high grade spring construction in both seat and back cushions, the former being provided with a spring edge adding greatly to the comfort of the passengers. The upholstering of the seats in all compartments is the latest in railroad practice, namely, Friezette plush. Ventilation is accomplished through large suction ventilators located on the center of the roof, the openings protected by neat ceiling register plates. The entire car, including platforms and vestibules, is lighted by electricity. The partition between the baggage room and negro compartment is movable and may be arranged to give the baggage compartment a length of 8 ft. or 10 ft. 5 in. to suit traffic requirements.

The framework of the car is entirely of steel, the under framing consisting of two I beams for center sills, and two channels for outside sills with truss rods for reinforcement. The center sills extend through to provide suitable supports for the rear platform. The outside sheathing is of sheet steel riveted to the posts with bats at the joints. The posts and carlines are of steel tees. The roof is of galvanized iron plates riveted to the carlines, except under the radiators where it is of copper with well soldered joints. The floors in the passenger compartments are of two thicknesses with a heavy layer of felt between. There is also an additional lining of sheet iron beneath the lower wood floor.

Basket racks of a continuous pattern are provided in all compartments.

The car is heated by hot water circulating in four lines of pipe on each side of the car.

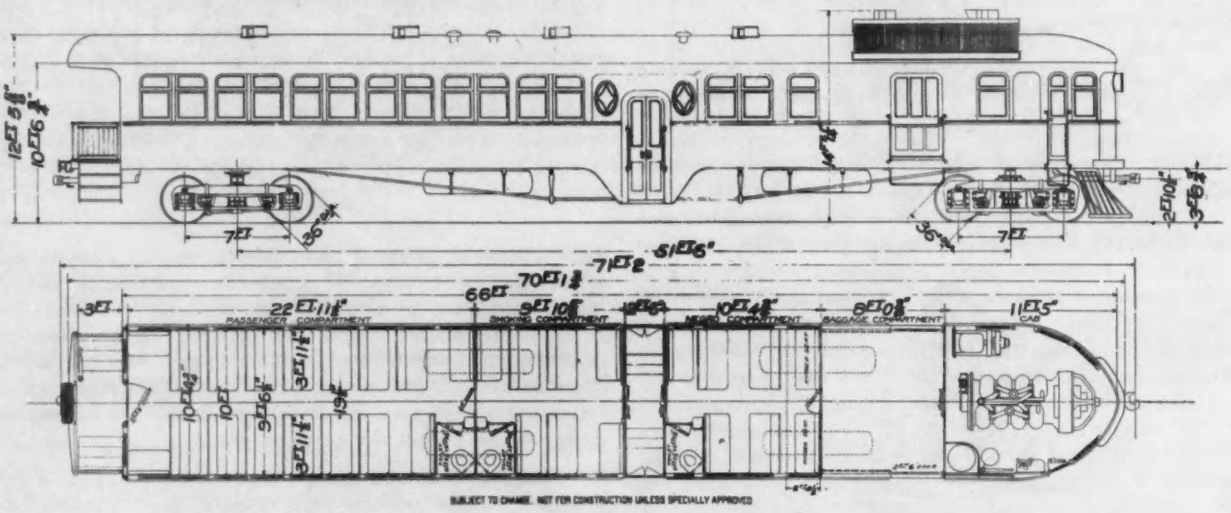


Fig. 1. New Type of Gas-Electric Car.

The front end of the car only is equipped with a pilot, inasmuch as the car is primarily for single end operation. Equipped and ready for operation, the car will weigh in the neighborhood of 48 tons.

A TELEPHONE PROTECTOR FOR OUTDOOR SERVICE.

A type of open space cutout in extensive use throughout the country today on telephone lines, both in railroad and commercial service, is the so-called No. 86 type protector, manufactured by the Western Electric Company.

This protector is made in two forms—one with a tin cover and the other with a cast-iron cover, known, respectively, as the Nos. 86-A and 86-B. These covers are chained firmly to the framework of the protector mounting, so that they cannot be lost through carelessness of the lineman.

The proctector itself is mounted on a porcelain base through the bottom of which the leading-in wires are brought in, and consists of heavy carbon blocks as shown in the illustration. The spacing between these blocks regulates the voltage at which the projector operates. Under normal conditions, this is adjusted to discharge at 1000 volts.

The shape of the carbon blocks gives a variable gap between the ground block and the two blocks connected to the line wire. The protectors are arranged so that carbon dust carried across by the discharge will not clog the spark

gap, but will automatically drop to the bottom of the protector.

The No. 86 type protector, as is noted, is designed for use both outside and indoors, and it is arranged so that it can be mounted directly on the pole itself. In some cases, it is desirable to have a protector which can be located in this manner outdoors, although as a general proposition, such a practice is not to be recommended on account of the additional maintenance difficulty thereby involved.

On telephone train dispatching lines, the No. 86 type protector is being used to a considerable extent throughout the country today, and it is giving very good satisfaction.

ANNUAL MEETING OF WESTINGHOUSE MFG. CO.

At a meeting of the board of directors of the Westinghouse Electric & Manufacturing Company, held in New York on August 1st, the following officers were elected:

Chairman of the board of directors, Robert Mather; president, Edwin M. Herr; vice-presidents, Loyall A. Osborne, Charles A. Terry, Harry P. Davis; acting vice-presidents, Henry D. Shute, George P. Hebard; comptroller and secretary, James C. Bennett; treasurer, T. W. Siemon; auditor, F. E. Craig.

Mr. E. M. Herr was elected to succeed Mr. Edwin F. Atkins, who has been president of the company since June, 1910, and who declined re-election.

Mr. Herr has been first vice-president of the company since 1905. He has announced the appointment of Calvert Townley as assistant to the president.

HEANY LAMP CASE.

About four years ago John Allan Heany, of York, Pa., and his patent attorney, and a young assistant examiner in the Patent Office, were indicted on charges of fraud and conspiracy in altering certain patent applications of Heany, then pending in the Patent Office, in an attempt to introduce into them inventions relating to tungsten incandescent lamps which had been made by others, information with respect to which, it was alleged, had been fraudulently obtained through the assistant examiner. On the trial the assistant examiner pleaded guilty and the attorney was tried and convicted, both being sentenced to imprisonment, and Heany was acquitted.

We now learn that on the termination of the criminal proceedings the Commissioner of Patents caused an investigation to be made with the object of ascertaining whether the fraudulent alterations in the applications were made with the knowledge or connivance of Heany. It was interrupted by a proceeding filed by Heany and the Heany Lamp Company, in the courts of the District of Columbia, in an attempt to enjoin the investigation. An injunction was issued by the lower court, but was set aside by the Court of Appeals, and investigation was then resumed. Testimony was taken and a full opportunity afforded to Heany and his associates to put in a defense. The decision of the Commissioner of Patents by Mr. Assistant Commissioner Billings, has now been handed down, holding that the applications of Heany pending in the Patent Office involved in the investigation had been tampered with and that among other things two sheets of paper on which the specification of one of the important cases was written had been abstracted and two other sheets substituted in place thereof; that this was done in pursuance of a conspiracy to fraudulently secure patents which would control the tungsten lamp business, and that Heany was a guilty party to the conspiracy. The Commissioner has ordered that certain pending interferences in which these applications under investigation were involved be dissolved as to the party Heany; that the Heany applications referred to be finally rejected on the ground of fraud, and that an endorsement to this effect be made on the applications and that they be removed from the files of the active cases of the office.

THE FARNSWORTH ELECTRICAL WORKS.

The Farnsworth Electrical Works have just completed the installation of an isolated plant with motor equipment for the San Francisco Salt Refining Company. The apparatus installed consists of the following: One 100-k.v.a., 2-phase, 220-v., G. E. alternator with exciter, 3-panel switchboard and Tirrell regulator, one 50-h.p. motor, two 30-h.p. vertical motors, two 30-h.p. standard motors, one 20-h.p. motor, two 15-h.p. motors, one 10-h.p. motor, one 5-h.p. motor, two 1½-h.p. motors, and complete wiring for motors and about 125 lights. The motors and generator were supplied by the General Electric Company. The switchboard is so arranged that any of the motor circuits can be connected to the service of the San Francisco Gas and Electric Company or to the generator. This firm also reports the recent sale and installation of a 75-h.p., 3-phase, 220-v. motor and a 5-h.p., 3-phase, 220-v. motor to the Petaluma Rock Company of Petaluma, Cal.

TRADE NOTES.

Munning-Loeb, Mattewan, N. J., manufacturers of electroplating and buffing apparatus and supplies, have appointed Otis & Squires of San Francisco as their Pacific Coast agents.

E. D. Hand, formerly with the Decker Electric Co., has been appointed Pacific Coast representative for the Brilliant Electric Co., the Atlantic Insulated Wire Co., the American Metals Works, the Enamel Metals Co., and S. H. Couch Co. He has established headquarters at room 310, Greenwood Bldg., 149 New Montgomery street, San Francisco.

The Fort Wayne Electric Works has been awarded a contract for an electric drill equipment from the Southern Consolidated Mining Company of Bodie. After a demonstration they found that the operation and economy were considerably in excess of the guarantees. A continuous run of forty days was made without a shut-down for repairs and less attendance was needed than for an air drill.

The Pelton Water Wheel Company has the contract for a 750-h.p. Pelton-Francis turbine, to be direct connected to its generator. It is to be operated under a 160 foot head at 400 r.p.m. and regulated by a Pelton oil-pressure governor. As a unique feature, a Pelton impulse wheel will eventually be mounted at the other end of the generator and operated under a head of 700 feet when there is a shortage in the main water supply.

F. B. DeGress, for over ten years New York district manager of the Crocker-Wheeler Company, has resigned from that company to assume the position of general sales manager of the Pulsometer Company, 17 Battery Place, New York City. Besides looking after the sales end of the business, Mr. DeGress is also carrying on a series of experiments, with a view to improving certain features of the pulsometer in order to make it suitable for general pumping work in power plants, industrial establishments, etc., so that it may become as popular for this class of work as it is in the general contracting field where it is now so well known.

H. M. Byllesby & Company, engineers and managers of public utilities, through their principal office at Chicago, confirm the reported purchase of the Sioux Falls Light & Power Company of Sioux Falls, South Dakota. This company owns and operates a water power generating plant on the Big Sioux River, reinforced by a modern steam auxiliary station, and serves the greater part of Sioux Falls with current for lighting, transportation and power. Formal possession will be taken in a few days with N. C. Draper, formerly of Zanesville, Ohio, as manager. Improvements and extensions will be made to the property.

NEWS NOTES

FINANCIAL.

OAKDALE, CAL.—Sealed bids were received until August 7th for the purchase of $25,000 water bonds and $20,000 sewer bonds.

SALMON CITY, IDAHO.—The Lemhi Power Company, C. L. Mackenzie, president, has taken over the holdings of the Andrews Light & Power Company, for a consideration of $76,000.

LOS ANGELES, CAL.—Mayor Alexander urges that the council authorize a bond sale of $3,250,000 at once. He states that the harbor will require $1,250,000 and the power enterprise at least $2,000,000.

SEATTLE, WASH.—J. C. Corbin & Co., American Bank building, Seattle, has been formally awarded the contract for constructing a new power plant at the Veterans' Home, at this place, at $13,987.

HONOLULU, H. T.—The Kehena Water Company has been incorporated with $10,000 capital, which may be increased to $1,000,000, to develop an irrigation system from the East Honokane waters of Kohala.

ASTORIA, ORE.—Bide were received by G. Lounsberry, clerk of the Water Commissioners, at the commissioners' office in the city hall, Astoria, Ore., until August 11th, for the purchase of $45,000 of City Water Commission bonds, to run 20 years, from date of payment, to bear interest at 5 per cent per annum, payable semi-annually.

MEXICO CITY, MEX.—The Electric Tramways Company of Mexico City has determined to spend a sum of $500,000 on the construction of new electric lines. Among the work undertaken is the completion of the Atzcapotzalco to Tlalnepantla line, the building of the Peralvillo to Valbuena line, and the electrification of the few lines of horse traction still existing in Mexico.

BAKER CITY, ORE.—Hainland Bros. have completed the capitalization for the $4,000,000 Ox Bow project. A million and a half have been already spent in tunneling through the Ox Bow curve. Two million and a half will be required to complete the project. A dam 1040 feet in length and 56 feet in height will be constructed and a power plant, the foundations of which have already been placed, will be built.

SPOKANE, WASH.—The International Power & Manufacturing Company, capital $250,000, has been incorporated by Wilbur S. Yearseley, Martin H. Gerry, Jr. The company is a subsidiary corporation of the organization developing Millwood, a manufacturing suburb, three miles east of this place. The company also intends to construct a dam across the river and erect a power plant for the operation of the Inland Empire paper mill.

INCORPORATIONS.

WALNUT CREEK, CAL.—The Walnut Creek Water Company has been incorporated for $200,000 by H. H. Scott, W. C. Burgess, F. B. Bradley, P. A. Thompson and J. W. Meyer.

GLENDORA, CAL.—The Glendora Independent Water Company has been organized with a capital stock of $200,000. The company has installed a new system of pumps at the wells.

SALINAS, CAL.—The California Consolidated Light & Power Company, Salinas, has been incorporated for $5,000,000, by C. S. Chaunsey, S. Goodrich, J. T. Pigott, T. E. Palmer, Grover O'Connor and G. R. Ray.

HOOD RIVER, ORE.—Articles of incorporation have been filed at Salem by the Hood River Terminal Company of Portland, the incorporators being W. A. Delashmutt, A. B., Ireland and W. Chapman; capital stock $5000.

RIVERSIDE, CAL.—The Cajalco Water Company has been incorporated with a capital stock of $10,000, of which $20 has been subscribed. The directors are A. R. Dickson and George Mabey, of Corona and Arthur S. Holden, F. D. Hudson and W. G. Farndale, all of Riverside.

ELKO, NEV.—The new camp of Jarbridge is to have electric light and power, the latter for the operation of mines and mills. The Jarbridge Power Company, with a capitalization of $100,000 has been formed and articles of incorporation have been filed. The incorporators are all Jarbridge people, Gilmore Kenney Jr., J. M. Kinney, J. T. Brunn and George F. Elliott.

ILLUMINATION.

BAKER CITY, ORE.—There is no prospect of the city lighting plant for which $25,000 bonds have been voted, being built this year.

PALMS, CAL.—The Board of Supervisors has issued a proclamation for an election on August 10 to determine whether or not a highway lighting system shall be formed in Palms.

PERRIS, CAL.—N. L. Graham of Riverside, representing F. A. Worthley, has applied for a 50-year franchise to operate an electric light and power system over streets and alleys of the city.

GRANDVIEW, WASH.—The Council has passed an ordinance granting to the Pacific Power & Light Company the right to construct electric light and power lines in the city of Grandview.

SEATTLE, WASH.—Bids were received by the State Board of Control, Olympia, until August 7th, for the complete power plant equipment at the Washington Veterans' Home, Fort Orchard.

LA MESA, CAL.—The San Diego Consolidated Gas & Electric Company has offered to extend its gas mains east from City Heights to La Mesa, provided 150 people in the vicinity agree to use it.

ELLENSBURG, WASH.—The City Council passed an ordinance revoking a gas franchise granted A. Wright and also gave first reading to the franchise submitted by Dr. J. T. Harvey of Ellensburg, granting him the right to manufacture gas for illuminating, heating and other purposes within the limits of the city.

COLTON, CAL.—A large central plant to be erected by the Southern California Gas Company is the latest industrial acquisition for Colton. Everything about the plant is to be on a big scale as the purchase of six acres of land and the expectation of investing $75,000 in the building and equipments attest. The company has bought with the intention of locating a great central plant for the manufacture and distribution of gas to this city, San Bernardino, Redlands, Riverside and other cities and towns of the valley.

TRANSMISSION.

BLAINE, WASH.—It is reported that the British Columbia Electric Railway Company will extend its power transmission line to this place.

LEWISTON, IDAHO.—It is understood that the Pacific Light & Power Company is perfecting plans to extend its electric line from Walla Walla to Clarkston.

BOISE CITY, IDAHO—Attorney Jesse P. Hawley, representing the Beaver River Power Company, has applied to the City Council for a franchise to operate in Boise.

BREMERTON, WASH.—The Bremerton-Charleston Light & Fuel Company, has applied to the Board of County Commissioners of Kitsap County, Wash., for the right to establish and maintain a line of electric poles and wires over and along the county roads of Bremerton.

EUGENE, ORE.—It is reported that Wilhelm & Sons will at once construct a concrete dam spanning the Long Tom river at this place. The dam will be 150 feet in length, 12 feet high and of sufficient strength to withstand the impact of strong waters. The structure will create additional water power for the operation of a flour mill.

RIVERSIDE, CAL.—Additional facts of importance concerning the power proposition which has been represented by F. A. Worthley of this city, have come to light. The company, which has secured franchises for pole lines in San Bernardino and Riverside Counties and has applied for same in the city of San Bernardino, is the Southern Sierras Power Company, financed by Denver capitalists. Delos A. Chappel is the vice-president and general manager and will probably have his headquarters in Riverside. The contract has been let for a steam plant at San Bernardino, or in the immediate vicinity of that city. This will have an initial capacity of 5000 kw. Contracts have also been let for poles and wire, and the installation of the transmission lines will be pushed with all possible speed. Distributing lines will be run to Moreno and Perris, and to Corona by way of West Riverside. The delivery of power to these sections will mean the development of thousands of acres of fruit and alfalfa lands that heretofore have lain dormant. An office has been opened in the First National Bank building in this city, and offices will be established in the surrounding towns.

TRANSPORTATION.

SAN DIEGO, CAL.—The bid of the San Diego Electric Railway Company of $60,000 for a 42-year franchise over all its lines in the city has been accepted by unanimous vote of the Council.

SANTA MONICA, CAL.—The City Council has granted the Pacific Electric Company permission to extend its Eighth street line from Fremont to Garfield avenue and the city clerk has been instructed to advertise for bids for the franchise.

SAN JOSE, CAL.—The San Jose railroads have made application to the Board of Supervisors for a franchise for a single or double track standard gauge electric railroad along Willow steet, Delmas avenue and Lincoln avenue, for a period of 50 years.

PORTLAND, ORE.—Plans for a terminal station have been filed with Building Inspector Plummer by the Mount Hood Railway & Power Company. The location is near the O. W. P & N. tracks, between Vancouver and Williams avenue; cost $45,000.

LOS ANGELES, CAL.—The Los Angeles Railway Corporation will let the contract for the new car barn to cost $150,000 and it will cover five and a half acres. Plans have been prepared by Chief Engineer George Kurts. There will be a fireproof concrete and steel building at Fifty-fourth and Arlington streets. Twenty-four tracks will be laid inside. An employes building of concrete and steel, measuring 100 by 100 feet, will also be built, which will contain bathrooms, billiard rooms, library and assembly room.

LOS ANGELES, CAL.—H. T. Hazzard has petitioned the council to allow the Los Angeles Railway Co. to run a spur track on West Fourth street, between Berendo and North Kenmore avenues, so that cars may be run around the proposed fill to be made there.

RED BLUFF, CAL.—The fund raised in the four counties of Yolo, Glenn, Colusa, and Tehama for the purpose of securing money necessary to make a preliminary survey and secure rights of way for an electric railroad from Woodland to Red Bluff, has now been completed.

SEBASTOPOL, CAL.—The Board of Trustees has passed an ordinance granting permission to the Petaluma and Santa Rosa Railway Company, for a period of 50 years, to construct a line of a standard gauge railroad, to be operated by electricity in public highways within the town of Sebastopol.

SAN JOSE, CAL.—The San Jose and Santa Clara County Railroad Company has made application to the Board of Supervisors for a franchise for a standard gauge electric railroad over the highway known as the Alameda, for a period of 30 years. Also for a franchise over Fourteenth street.

RICHMOND, CAL.—A plan proposed by John Nicholl and the Los Angeles Pressed Brick Company is the building of a street railway from Richmond avenue along Marine drive, which skirts Nicholl knob, around the point and thence down to the plant of the brick company, located on the bay shore southeast of the mole of the Santa Fe at Ferry Point.

SAN JOSE, CAL.—The supervisors have ordered a franchise over Saratoga avenue from Meridian corners to the limits of the town of Santa Clara, advertised for sale. It is the intention of the Peninsula railway to buy up the franchise in order that it may connect the interurban line with the lines running out Alameda to Santa Clara, thus forming a loop on which to operate its cars. The franchises of the San Jose and Santa Clara Railroad Company on the Alameda and North Fourteenth streets and that of the San Jose Railroad Company's Delmas and Willow streets line, which have expired, were also advertised for sale. Bids for these franchises will be opened on September 5, at 11 a. m.

TELEPHONE AND TELEGRAPH.

ENTERPRISE, ORE.—Carl Roe is at the head of a project to establish a telephone system here.

PETALUMA, CAL.—The Petaluma Rural Telephone Company has decided to build a rural line from Petaluma to Cotati.

KALAMA, WASH.—The county commissioners have granted franchises to the Cowlitz Bend Telephone Company for the construction of telephone lines.

COLUSA, CAL.—The Tehama County Telephone Company will be ready for business in a few days. The new company contemplates extensive improvements in all parts of the county.

SEATTLE, WASH.—The public service commission's figures as to the value of the two local telephone systems, is as follows: The Bell or Sunset telephone system, valued at $3,100,000, and the value of the Independent telephone system's property in Seattle at $1,500,000.

WATERWORKS.

SALEM, ORE.—The State Fair Board has appropriated $10,000 for the enlarging of water mains, and extending the same in the fair grounds.

PROSSER, WASH.—The City engineer has been instructed to prepare plans for the construction of a distributing system to furnish the city water from the government irrigation ditch.

MEDFORD, ORE.—Bids were received by the city council, up to August 15th, for the purchase of $4000 in bonds for the installation of water mains.

PRESTON, IDAHO.—This place will soon call a bond election to cover $90,000 for a village water system. J. N. Preston, chairman, village board.

BRIDGEPORT, CAL.—Sealed bids have been received by the Board of Supervisors for the erection and installation of a complete water system for use of the county court house at Bridgeport.

MADRAS, ORE.—A petition asking that W. P. Myers and O. C. Young, be granted a franchise for the establishment of a water system for the town of Culver has been granted by the council.

GOLDENDALE, WASH.—The Valley of Glenwood is to be irrigated with water from Hell Roaring Creek. This valley is located 30 miles north and west of Goldendale on a tributary of the Big Klickitat.

LONG BEACH, CAL.—The local Board of Water Commissioners will employ a consulting engineer to draft plans and specifications for improvements and extension of the city water plants on a large scale.

CONNELL, WASH.—A franchise for laying the water mains in the town of Eltopia has been granted by the council to A. R. Hamilton for 25 years. The same franchise was also granted and for the same term to C. G. Fuller.

AUBURN, CAL.—The residents of Prospect Hill, in the western portion of the city, are having a water famine. If conditions do not improve, the people intend to put in a pumping plant, getting their supply from the Kelley well.

OLYMPIA, WASH.—Owing to the lateness of the season the State Board of Control has decided not to continue asking bids on pumping equipment for the State penitentiary at Walla Walla. Bids for this machinery were to be opened on August 14.

RED BLUFF, CAL.—Norman R. Smith, the patentee of the water pumping plant soon to be installed here, is in Red Bluff from Grants Pass, Ore. Mr. Cunningham has put one of these plants in the river at Anderson and in time will install one in the river at this place.

WOODBURN, Ore.—A special election will be held in the forepart of September to decide on a bond issue of about $25,000 for acquiring the present water plant, now owned by an independent company. If bonds are authorized extensions will be made.

NORTH BEND, ORE.—At a meeting of the commission from the North Bend council with the members of the council of Marshfield it was decided to employ an engineer to obtain the probable cost of building a new water system and also the cost of improving the present system which it is proposed to take over from the Flanagan & Bonnett Water Company.

NANAIMO, B. C.—City Engineer Waters reported the following estimate on the installation of an additional water main; approximately $10,000 for 18-inch wood stave pipe, $18,200 for an 18-inch steel welded pipe and the sum of $21,100 for an 18-inch cast iron pipe. This place is decidedly in favor of installing the additional main and an election for authorization of bonds is probable.

WALNUT CREEK, CAL.—A new water plant has been built in this place by the R. N. Burgess Company and was placed in operation on August 10. A power line is now being erected by the Pacific Gas & Electric Company to the artesian wells and reservoirs of the system, which are about one mile from town. The new plant will serve water in competition to the present plant in operation.

LOS ANGELES, CAL.—The Kern Meadows Land & Water Company, handling a tract of 10,000 acres in Kern county, plans to develop the land by completing a perfect ditch system and drilling sufficient number of additional wells to give ample supply to water users. H. E. Carse, consulting engineer who will have charge of water development and is general manager of the company has his main office at 222 Security Building.

ASTORIA, ORE.—The water commission has considered the plans and specifications submitted by Engineer Lars Berosvik for the construction of a dam at the head works and a storage reservoir with a capacity of 100,000,000 gallons. The plans have been accepted by the commission and the construction ordered advertised at once. The work is to be completed October 1, 1912. Bids were received up to August 14th. The dam will be 25 feet long on the bottom, 160 feet long on top, 54 feet in width at the bottom, 111½ feet wide at the top and 74 feet high, and will cover an area of 22 acres.

NEW CATALOGUES.

James Beggs & Co. of New York have recently completed their attractive new catalog on the Blackburn-Smith Pressure Filter.

The Bates Machine Co. of Joliet, Ill., has issued a new catalog on the Cookson castiron heaters and receivers with cut-out valves.

The Western Electric Company have recently published Bulleten No. 1105 on Inter-phone systems, filled with interesting illustrations.

The Gould Storage Battery Company have just published an attractive Bulletin No. 12 on the storage battery installation in the Detroit river tunnel plant.

The Triumph Electric Co. of Cincinnati, Ohio, have just issued Bulletin No. 481, on alternating generators of the direct connected type. It is well illustrated and instructive.

The Kerr Turbine Company of Wellsville, N. Y., have issued an artistically illustrated catalog on the Kerr steam turbine for driving generators, centrifugal pumps, fans and other high speed machinery, and for belt drive.

The National Tube Co. of Pittsburgh, has just issued Catalogue H, embracing wrought pipe for steam, gas, water and air. Cast, malleable iron and brass fittings. Brass and iron body valves and cocks. Radiators and coils. Drive well points and well supplies.

The Electrical Engineers Equipment Co., of Chicago, announce through their Pacific Coast agents, J. C. Farrar & Co. of Los Angeles, the issuance of their new catalogue on electrical fittings for power plants. The publication is profusely illustrated and contains much valuable information in addition to listing of its standard fittings.

Catalogue No. 15, from the H. W. Johns-Manville Co., contains over 400 pages of illustrations and descriptions of their various electrical specialties. These include materials for insulating, for overhead line construction, mine and third rail work, as well as the Linolite system of illumination and underground fibre conduit.

The Kellogg Switchboard & Supply Co. has recently issued a new apparatus bulletin. It is altogether a new and unique catalogue in the Independent Telephone industry, in that it covers all the important items in standard telephone work. Each item is illustrated, coded and given a brief description. Since sending out this catalogue, we have received many favorable comments from our customers and the trade generally. A telephone man wishing to buy anything from binding posts to pole changers, or dry cells to a twenty thousand line exchange, can find the important specifications in this catalogue in a minute's notice by referring to a comprehensive index.